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INTRODUCTION

The Europe 2020 Strategy and Digital Agenda for EU set the political framework to achieve smart and inclusive European development based on Information and Communications Technologies (ICT). Surveys conducted by analysts such as Forrester Research (2009) and McKinsey Global Institute (2012) demonstrate that Social Technologies (ST) continue to grow in popularity in society and these developments will influence policies and drive economic and societal changes. Following the Internet design societies, organizations and movements have evolved from bureaucratic/centralized to decentralized and distributed networks (Barahona et al., 2012). Social media use has exploded, transforming the way that people share and consume information; social networks are becoming the preferred method of communication for new generations. "The recent successes of systems like Google, Wikipedia or InnoCentive suggest that individuals and groups can create valuable intellectual products more effectively by acting on the basis of a Collective Intelligence (CI)" (Malone, 2012). Therefore, it is very important to stimulate and support the emergence of innovative social technology-based networks (platforms) for developing and fostering collective intelligence and awareness in modern society.

The scientific problem in our project is defined as a question: how could social technologies contribute to the development of a smart and inclusive society? The answer to this theoretical question can have huge practical implications by influencing more reasonable and sophisticated application of social technologies in practice (Skaržauskienė, Pitrėnaitė, 2013). The subject of our research are online community projects (collective intelligence systems) which include collective decision making tools and innovation mechanisms allowing and encouraging individual and team creativity, entrepreneurship, on-line collaboration, new forms of self-regulation and self-governance, and self-configuration of communities by considering these projects as being catalyst for the emergence of CI.

Collective intelligence has existed since the emergence of mankind. Families, armies, states and organisations occasionally acted and made decisions collectively; therefore, their actions exhibit certain features characteristic of collective intelligence (Malone, 2012). The essential

difference between collective intelligence and individual intelligence is that social interaction is especially important for the formation of collective intelligence (Goyal, Akhilesh, 2007). In recent years, with the emergence of the Internet, collective intelligence has been newly strengthened. Speaking in common managerial terms, a networked society is a social structure in which accumulated knowledge is dispersed, processed and new knowledge is generated through the use of information communication technologies. Connected by the Internet, groups of people collectively create new wide-scale and high-quality intellectual products practically without any centralised control (Malone, 2012). Alongside that, we are witnessing the intensifying scientific research into the issues pertaining to collective intelligence (Nann, Takahashi, 2010; Introne et al. 2011; Malone et al., 2012; Engel et al., 2014, etc.). The MIT Centre for Collective Intelligence has been established at one of the most prestigious US academic institutions, the Massachusetts Institute of Technology. The researchers working here seek to understand the phenomenon of collective intelligence and to use communication technologies for creating new forms of CI in a networked society.

Researchers of the international McKinsey Institute (2012) define Social Technologies (ST) as digital technologies used for human social interaction in the course of which content is created, information is shared and, thus, value of the newly created content is changed. ST are all technologies that are used for social purposes or on social basis and that comprise social hardware (the traditional communication media), social software (computer media) and social media (social networking tools) (Helmer et al., 1966; Alberghini et al., 2010). We have only just started to perceive the real potential of social technologies and the possibilities for the emergence and development of collective intelligence. Social technologies offer additional possibilities for changes in communication – "social action is transferred to the virtual dimension that employs the internet speed, scale, huge counting resources and small information transmission costs as well as opening up the possibility to cross geographical and time zone limits" (Chui et al, 2012). Despite the ongoing rapid development of social technologies, further growth of ST possibilities is expected in the future. For instance, today more than 80 percent of the world population with access to the Internet communicates through social networks regularly, while 65 percent of the world population does not have (or have very

limited) access to the Internet (McKinsey Research, 2012). The true extent of expansion and impact is not yet known. Information technologies undergo constant cycles of renewal, and more sophisticated and more integrated technologies are being developed. Software creators constantly improve the tools that offer new possibilities for collaboration (Jue et al., 2009). Alongside popular web applications such as LinkedIn, Facebook, Twitter, new collaboration platforms emerge that address the changing needs of the Knowledge Society, for example, Pinterest (http://pinterest.com/), Instagram (http://instagram.com/), Quora (www.quora.com), etc.

Social technologies "provide us with the possibility of forming an influential unified voice – for a consumers group or even whole community – that can have huge influence on the development of collaboration among various social groups or even formation of politics" (Chui et al., 2012). Intellectual abilities emerging from groups or collective entities create stimulating pre-conditions for creativity and innovation. Groups and organizations develop collective mental models (Senge, 1990) influencing group decision making processes and implementation activities. Social technologies enable the emergence of new initiatives, new connections and group dynamics and they encourage conscious human self-organization, making it possible to influence positive changes in community and state governance. However, Collective intelligence, created with the help of social technologies, can be destructive to the existing power structures (both corporate and governmental). The role of social networks in organizing the Arab Spring in 2011 serves as an example (Bughin et al., 2011, Divol et al., 2012).

Scientific analysis of the influence of social technologies on formation of collective intelligence raises many questions. Society faces a practical problem pertaining to the existence of a wide variety of social technologies and the functioning of many diverse societal platforms. However, these pre-conditions do not encourage growth of collective intelligence since people do not collaborate. They express their opinion but do not structure it, and do not assume obligations to implement decisions, etc. Through social technologies an increasing number of consumers become participants of global conversation and create their own content. However, the quality of the content created by users can differ dramatically, varying from excellent journalistic work to spam or even abuse and insult (Bauerlein, 2008). Some critics maintain that, due to the short format content provided in

social networks, people face increasing difficulties in the acquisition of huge and complex amounts of information. There is also a different view, claiming that an abundance of viewpoints improves critical thinking and that media literacy is a welcome phenomenon (Carr, 2010). Scientists are also arguing over the importance of collective intelligence, some of them take the impact of collective intelligence unconditionally, while others express doubts about its purposefulness. This is another reason why in-depth research is necessary in the field of the development of collective intelligence, including investigations of its practical aspect. From the scientific perspective, it is not the analysis of the phenomenon of collective intelligence in itself that is important; rather, we should focus on the identification of the pre-conditions for the formation of collective intelligence, a formulation of holistic conceptions, the forecasting of potential development scenarios and the collection of empirical data about the importance of collective intelligence for social innovations. Through better understanding of the developmental conditions and pre-conditions of collective intelligence we will give meaning to the influence of social technologies, provide a possibility for practitioners to integrate or create new tools and IT-based applications oriented towards societal values.

Social technologies, just like collective intelligence, is an inter-disciplinary research field under development. Collective intelligence research comprises disciplines from computer science, communication, management, economics, social psychology, sociology, political sciences and various other disciplines. The novelty of this monograph lies in its original viewpoint in the interaction between social and technological sciences. The synergy emerges from the monograph's authors" inter-disciplinary competencies and their background in international research. Our focus is not on the dominance of technologies, but rather on their social aspects and the creative power of collective intelligence created by using these technologies. It means that technologies and their added value for society are an object of research in social sciences: sociality, public spirit and even entrepreneurship are increasingly created with the help of technologies (Derksen, 2012). Instrumental scientific technological approach to social life demands increased attention of researchers since the major function of social technologies is social aims (Mayer, 2009).

The aim of this monograph is to suggest not only managerial and organizational but also legal measures that would activate and support

the emergence of collective intelligence in innovative social technologies-based platforms. The conception of collective intelligence as intelligence reflecting the ideas of direct democracy and/or omnicracy in upcoming stages, will inevitably face legal and administrative obstacles, e.g., attempts to implement decisions adopted through collective intelligence in a community, will need that community's obligation and changes in legal regulations. Another important aspect is the necessity to ensure equal accessibility of all society members to technologies, i.e. for all to have the possibility to use the means necessary for the implementation of collective intelligence projects (communication equipment and Internet connection). It is an inter-disciplinary problem; however, if it remains unsolved, the principle of equality of all citizens, which is one of the fundamental premises in democratic law, would be compromised.

This purpose will be achieved through the following set of complementary and independent actions:

1. To define the phenomena of collective intelligence, to evaluate the potential and benefits of collective intelligence to tackle societal changes by comparing CI with other forms of intelligence and by distilling the best practices of CI development from existing and new initiatives for online community projects targeting the integration of the various scientific approaches.
2. To identify the main social, managerial obstacles and legal presumptions, challenges and risks (privacy, censorship and restrictions) influencing the emergence of online community projects by considering these projects as sensors for development of collective intelligence.
3. To identify social relationships and evaluate shared activities of agents (participants) in virtual platforms which include elements of collective decision-making tools and innovation mechanisms allowing collaboration and the sharing of knowledge; to fulfil the analysis of how different technological solutions and design influence the performance in networked communities.
4. To contribute to the emergence of new possibilities for the development of collective intelligence by providing advanced concepts and managerial, organisational and legal solutions and recommendations empowering people and future communities to create new forms of decision making, self-regulation and self-governance,

self-configuration of communities, allowing and encouraging individual and community creativity, social entrepreneurship etc.

5. To introduce the conceptual system dynamic model of collective intelligence as a system for holistic understanding of the collective intelligence emergence process and to propose a set of criteria for measuring the collective intelligence (CI Potential Index) based on the empirical research results.

In Part 1 of the monograph, the concepts of social technologies and smart society are defined. Part 2 of the monograph is focused on the advantages and the potential of the phenomenon of collective intelligence in overcoming social challenges and solving social problems. Collective intelligence is compared to other forms of intelligence and the experiences of the emergence of collective intelligence are surveyed by integrating diverse research viewpoints and perspectives. Part 3 presents a system approach to collective intelligence and begins with the description of the research methodology for developing a collective intelligence monitoring technique. The online community projects are defined as the subject of the research and their classification provided. Here, the main criteria for the emergence of collective intelligence are identified and a hypothesis about the potential of CI is formulated. In Part 4, the findings of quantitative and qualitative research are described: the potential of Lithuanian online communities for civic engagement and for fostering innovations is evaluated, the hypothesis is analysed and validated, and the trends and possible development scenarios are discussed. The profile of frequent internet users is presented and legal risks (privacy, censorship, limitations, etc.) related to online activities are identified.

In Part 5 and in the Conclusions section of the monograph, the scientifically-based managerial recommendations and organizational tools for fostering collective awareness and intelligence in networked society are provided. The praxis of indices calculation in social sciences is presented and the methodology of developing a new managerial tool for measuring the potential of collective intelligence is described. The authors disclose the results of experimental application of the CI Potential Index by evaluating online communities in Lithuania. Finally in Part 6, a conceptual system dynamic model is proposed that explains the knowledge management in online communities from a systemic perspective.

1. SOCIAL TECHNOLOGIES FOR SMART AND INCLUSIVE SOCIETY

1.1. Smart and Inclusive Society in Lithuanian and European Context

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1.1.1. The Concept of Smart Society

The existing multiple interpretations of the concept "smart society" can be grouped into two directions that aid in explaining the narrow and broad perception of society. The narrow perception of smart society is developed by the technological approach which is related with the expanding integration of smart machines into daily human life (Hartswood et al., 2014). Seang-Tae (2011) forecasts of world trends, EU Digital Agenda 2020, the *smart everywhere* vision (Digital Agenda for Europe, 2014) as well as the "smart society" project financed by EU FP7 – all emerged in this context. For instance, the research object of the aforementioned Smart Society Project is collective adaptive systems (CAS) and their transformation into hybrid systems in which humans and machines would work together in order to create a smart society (Smart Society Project, 2013).

Collective adaptive systems comprise multiple heterogeneous subjects (e.g., individuals, groups, computers, robots, applications, sensors, services) that all interact in order to achieve global preferred behaviour or service in a hardly foreseeable way. The greatest challenge in the development of the systems is the creation of adaptation mechanisms which would enable to join or leave the system without disturbing joint activity focused on achieving a goal. This is closely related to the choice of the best strategy that would determine the behaviour with regard to the existing environmental conditions (Bakhouya and Gaber, 2014).

The broad perception of smart society is provided by the social trend which is related to collective intelligence that emerged on the basis of human collaboration and that can, by using technological tools, aid in better solutions to the problems existing in society or organisation and coordinate inter-connected actions (Woolley et al., 2010; Malone

et al., 2009). In this context, we talk about "Twitter Revolution" in Iran (Morozov, 2009), virtual communities (Kraut et al., 2012), Horizon 2020's "challenge-based approach" (Blau, 2014), the changes in the EU innovations policy and the concept of "smart specialisation" that were instigated by Europe 2020's vision (McCann and Ortega-Argilés, 2013), and the creation process of Lithuania 2030 Strategic Vision (Lietuva2030.lt, 2014). For instance, in 2010, State Progress Council (Lrv.lt, 2014) decided to develop the top-level Lithuanian strategy that would be based on the bottom-up policy formation process; during the development of the strategy, innovative tools of collective intelligence creation were used: ideas were presented on a web page created specifically for that purpose, reports about citizen activity in different regions were delivered, and it was possible to sort ideas according to themes and regions.

1.1.2. Smart Society: Governance Challenges and Possibilities

Despite our broad understanding, multiple challenges pertaining to state governance arise. Therefore, the need for smart governance is referred to, which is affected by constant multi-level drive towards globalization on the one hand and gradual societal transformation from industrial into knowledge society on the other hand (Willke, 2007). The multi-level governance, common in the European context, has been transforming from general level into the level based on concrete-tasks and dominated by flexible structures and overlapping jurisdictions and memberships (Bache and Flinders, 2004). On this level, managerial problems similar to those solved by technologized collective adaptive systems arise; however, the question of how complex social context can be transferred to the framework of sophisticated though still limited technologized environment remains unanswered.

Currently, we have only started facing the dawn of a real breakthrough in the field of collective intelligence. At the moment, the arising questions regarding system management are not solved because we have just started attempting to perceive the entire complexity of similar systems, their possibilities and threats. However, mere attempts to touch upon the field raise numerous controversial questions.

One of the greatest challenges of smart governance is related to the risks emerging due to the uncontrollable use of social technologies and to ethical issues (Hartswood et al., 2013). An appropriate example could

be the controversial experiment carried out by Facebook researchers in the social network without its users being aware of the emotional manipulations they were exposed to (Waldman, 2014). Another example is that of the former US National Security Agency employee E. Snowden and the facts he leaked regarding the unethical surveillance of US citizens by the PRISM programme (Greenwald and MacAskill, 2013). The leaked facts renewed discussions about the innate right of the citizens of the EU member states to privacy (Maxwell, 2014) and accelerated a faster adoption of legal acts regulating the "right to be forgotten" (Rosen, 2012). This forced Google to apply the mechanisms of the implementation for that right. Günther Oettinger's appointment as the EU Commissioner responsible for the implementation of Digital Agenda 2020 is likely to cause even greater collision and confrontation between the US and Europe in the sphere of privacy protection and development of social technologies because namely this politician is known for blocking EU negotiations with Google (Robinson, 2014).

In the realm of research, there is a growing amount of scientific research and EU projects related to "responsible research" (Owen et al., 2012; Von Schomberg, 2011); therefore, it can be claimed that the researcher ethics and privacy issues will continue to be important.

Another challenge, as well as a possibility for a smart society, is related to the concept of "social capital" (Putnam, 2001; Sabatini, 2009). Though the concept of social capital should impose on people altruistic goals, there is also research available which reveals highly rational and selfish motives behind it (Chalupnicek, 2010). The relationships of trust among institutions are embedded in local economies and form citizen engagement networks which, in turn, have an impact on politics, economy and other spheres (Putnam et al., 1993). The level of societal mutual trust and cooperation positively influence the economy (Knack and Keefer, 1997) and regional development (Cooke et al., 2005). However, certain threats linked with social capital can also be discerned: closing up within one's communities, constraints of individual freedom, privileged access to community resources and limitations on the engagement of outside persons (Portes, 2000). If problems of the forming social capital are not solved, if value dimensions of the subjects acting in a collective network are not aligned and if technological decisions are implemented in an immature environment, these technological decisions can accelerate

negative aspects of collective systems and distance us even more from the desirable goal. Or, on the contrary, the design of technological decisions and the imposed framework and structure can give impetus to the purposeful forming of social capital towards a common good.

1.1.3. Lithuania 2030 and Europe 2020: Similar Objectives but Different Contexts

Next, it will be described how the formation of the new paradigm of smart society is reflected in the Lithuanian and European contexts. Lithuania's Progress Strategy "Lithuania 2030" (Lietuva2030.lt, 2014), approved by Resolution of the Seimas, presents Lithuania's vision and the priorities of state development until 2030. The Strategy stresses the need for substantial changes based on the principles of sustainable development and state and society's tangible and intangible resources. The Strategy also defines the major problems: identity crisis, the power of stereotypes, emigration, and closed society, lack of tolerance and trust, lack of concern for one another and the environment, fragile faith in state's success.

The fundamental initiatives seek to make the society more active in order to achieve a goal when every inhabitant of Lithuania is a participant in the substantial changes. In the Strategic Vision, Lithuania is seen as a smart country where people enjoy life and working conditions, and the concept "smart country" is specified by such dimensions as "smart society", "smart economy" and "smart governance" and is based on three values that are essential for progress: openness, creativity and responsibility.

The part of Lithuania 2030 Strategy that describes a smart society is aimed at creating a culture based on the sense of community and trust, it points to the need to re-consider national identity, to find the links that unify society and to enhance the power of citizens. In the course of the preparation of the Strategy, practical initiatives for rallying a smart society emerged, e.g., "I to Lithuania", "Lithuania 2.0", "Global Lithuanian Leaders" and others. Such a society will develop faster in an environment which is dominated by the open and empowering governance that is referred to in the part describing smart governance.

At the same time, Europe is also seeking answers to the global challenges faced by all European Union countries. The major challenges are listed in the shorter-term strategic document – Europe 2020 Strategy (2014). Europe 2020 Strategy is aimed at creating the preconditions for Europe's ongoing

smart, sustainable and inclusive growth. Since Europe 2020 Strategy embraces a shorter period than Lithuania 2030, it is dominated by more economic and social aspects: the rate of unemployment, small investing in R&D enterprises, poverty and social exclusion; however, considerable attention is given to climate change, energy sector, society's literacy.

It should be noted that the word "smart" is used in the context of Europe 2020 Strategy to refer to smart investments into education, research and innovations; meanwhile, in the context of Lithuania 2030 Strategy, it is used to refer to three dimensions (society, economy, public governance).

Seven flagship initiatives are employed to achieve the goals of Europe 2020 Strategy; the first initiative (EU Digital Agenda, which seeks to aid businesses and society to achieve maximum value through development of technologies) and the second initiative (Innovation Union, which seeks encouraging a wider smart specialization in the fields of research and innovations and enhancing the efficiency of cooperation between public and private sectors) are most important for the development of collective intelligence and sense of community.

Importantly, the optimization of the functioning of the public sector, the spheres of national awareness and sense of community are almost exceptionally the initiatives set forth by the Lithuanian strategy, they are not stressed on the European level. This can be accounted for by the need for innovations in political development in Central and Eastern Europe, especially as regards the application of democratic society models (of which both the content and form have to be implemented as a complex) in an unprepared or resistant environment (Melnikas, 2011).

The Lithuanian model of a democratic society is characterized by the instruments of direct democracy and citizen initiative that have been rather well developed during the short period of independence, but they are not used to their fullest due to the lack of citizen activity, political competence and habits of expressing their will as well as the common attitude that citizens cannot influence the decisions adopted by the government (Krupavičius, 2012). As Norkus (2011) concludes, Lithuania did not pass the test of liberal democracy during the impeachment of R. Paksas since the process occurred under the most unfavorable (marginal) conditions. Therefore, Lithuania remained the only post-communist and former national communist country which pact of the ex-communist and anti-communist elite was not denounced.

Even the problems of those countries that were under the influence of the Soviet Union, though more distanced, are similar. The attempt to encourage the creation of civic society in an unprepared environment in Bulgaria resulted in large numbers of imitation "non-governmental" organizations, the so-called PONGO or GONGO, that are, in fact, governed by the state or politicians (Cenkov, 2010). Hungary, which has long been considered an exemplary state that has successfully implemented reforms and is transforming into a Western democracy model, currently is being blamed for emerging authoritarianism inside the EU, persecution of NGOs, increasing corruption (The Economist, 2014).

However, even the old European countries are also experiencing the crisis of representative democracy due to the philosophy of individualism, globalization and Europeanisation. Here, the re-creation of the links between government and society and the development of the linking capacity become a critical factor that is possible owing to the implementation of public innovations and encouragement of policy networks among interested groups and governmental institutions (Bekkers et al., 2011).

It is obvious that the re-creation of the link between government and society is a very important factor to Lithuania as well; however, it is not clear what means could be employed to re-establish the link most quickly and efficiently. In 2013, The Civil Society Institute conducted research into the civil potential of Lithuanian citizens that revealed that the civil potential of the Lithuanian society is slightly growing. The civil potential is highest in schools and the public sector is second. The total civil potential of the society remains very low – 36 points out of 100 possible (PVI, 2014). Charity and voluntary environmental communal actions (51 percent) and the activities of local communities (37 percent) have long been the most common civic activities.

The findings possibly show that it would be most efficient to have the civic participation initiatives aimed at young people and communities where a long-term link could be established since voluntary environmental communal actions are short-term and charity events solve social issues that are usually local.

Tijunaitienė and Bersenaitė (2011) reviewed the research on citizen participation in Lithuanian non-governmental organizations and concluded that local communities hold the highest potential since the problems they solve are closest to the particular environment of an

inhabitant, while, as regards non-governmental organizations, Lithuanian citizens usually seek self-actualization or good past-time rather than active representation of public interest.

Meanwhile, the research by Šilinskytė et al. (2014) indicates that most of the state initiatives that seek activating the dialogue between society and government are centralized and the reform, which was aimed at the implementation of the EU principle of subsidiarity, the encouragement of new public governance ideas and enabling citizen participation in the public policy, failed: both communities and local governments have overstepped the limits drawn in the models, the models were not appropriately implemented and the outcome was opposite – instead of cooperation, resistance to the implemented policy formed.

1.1.4. Major Issues Pertaining to Lithuania: Perspectives for Their Analysis

Lithuania's major problem (low civil activity and overall societal disillusionment) can be solved by social technologies. The general level of the country's technologisation is relatively high as regards the infrastructure of information technologies, existing solutions and user accessibility. The number of inhabitants is small. If every inhabitant of Lithuania is considered a potential "client", this would correspond to a 3-million-user market and this is a solvable task even for a young Silicon Valley technological enterprise launched by 3-5 persons.

Chapter 2 of this monograph substantiates the huge potential of using collective intelligence in networked society: its value for the public sector, enterprise management, innovations and the entire society. In the context of smart society, however, the potential related to the adoption of decisions stemming from society's opinion or those aligned with society's opinion is most important since this is the main axis of modern democracy. This chapter includes examples of technological and organizational innovations that are currently adopted in the world; thus, the basic question is not "Is it possible?" but rather "How?", through the use of social technologies, to efficiently activate and rally society and governmental institutions, to form networks of collective intelligence capable of solving complex manifold tasks and to encourage innovations in political development.

When we talk about specific ways of implementation and effectiveness, we inevitably have to talk about measurement methods that could aid in

measuring system potential, the firmness of internal ties among elements and development possibilities. The complexity of the problems makes one turn to the holistic paradigm (Smuts, 1927) that was partly based on A. Einstein's theory of relativity (Tsokhas, 2001) and that can have an impact on social sciences similar to the impact A. Einstein had on physical sciences. Contrary to physical sciences, the theory of Smuts has only now found favorable conditions since the possibility to partly overcome the entire complexity of social relations emerges under the influence of collective intelligence and social technologies. In addition, we have only recently started using the "holistic" methodologies or "methodological systems" (Jackson and Keys, 1984; Mingers and Brocklesby, 1997) that help in obtaining more reliable results and carrying out future-driven research. Efficiency research on the global level has also advanced and a huge need for constant mutual comparison of different countries" progress has formed: from global measurement of competitiveness (Schwab, 2013) to happiness measurement by indices (Helliwell et al., 2013). A group of researchers from Massachusetts Institute of Technology have designed a theoretical model of analysing collective intelligence and named it "The Genome of Collective Intelligence" (Malone et al., 2009). Based on the model, researchers from different countries carry out practical research and apply the model for their needs and, thus, a deeper understanding of collective intelligence is achieved. The overall variety of research in the field of collective intelligence is overwhelming: from examples of collective intelligence in the populations of fish, birds or ants (Szu et al., 2004), prospects of using robotic collective intelligence (Beni, 2005), decisions regarding global climate change (Malone, Klein, 2007), education (Gregg, 2009) to societal inclusion or solving the problems pertaining to the sense of community through creation of virtual communities (Luo et al., 2009).

Looking at the future, available competences, potential access to data, it is namely the latter direction (virtual communities) that has attracted the attention of a group of Lithuanian researchers and encouraged joining efforts in identifying collective intelligence in Lithuania. Chapters 3 and 4 of the monograph are focused on this issue.

The ability to recognize collective intelligence in virtual communities could contribute to solving another painful question in Lithuania, i.e., how, through the use of technologies, to multiply the successful cooperation

models that have formed in some communities and how to implement them on the national scale through virtual means, or how to effectively transfer good experience to other communities. The first research findings indicate a larger involvement of young people in virtual systems of collective cooperation as well as increasing civil power. Thus, this research creates conditions for achieving a breakthrough in the formation of civil potential through the participation of the young "digital generation" in virtual communities. What is more, all this research is related to the common decision-making process, or what Bonabeu (2009) called "Decisions 2.0" in business context. This implies that the knowledge accumulated by researchers, the created models and recommendations can be relatively easily transformed in other spheres where: (a) it is necessary to make decisions; (b) people participate; and (c) there is a need to accelerate the decision-making process or to solve problems of complexity through technologies.

1.2. Defining Social Technologies

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The concept of social technologies has rooted itself in various disciplines of science in recent decades. Application of such technologies has a major potential for practical application and capability to make a real impact on social reality, making it a viable interdisciplinary research area. The major objective of this is to provide insight into the concept of social technologies, to further its understanding in information and knowledge society by analyzing new application forms and needs.

Information and communication technologies have become an integral part of everyday life. MacKenzie and Wajcman (1999) stress that "technologies feed, clothe, and provide shelter for us; they transport, entertain, and heal us; they provide the bases of wealth and of leisure; they also pollute and kill". Surveys conducted by analysts such as Forrester

Research (2012) demonstrate that popularity of social technologies continues to grow in the society from politics to personal communication, from production of building materials to state management. Koo et al. (2011) emphasized that "even though the term "social communication technologies" is most commonly used to refer to new social media such as Twitter and Facebook, a scientific redefinition based on the original definition is needed". According to Chui et al (2012), currently, "the concept of social technologies has several aspects which destabilize the dominant status of technology". It is becoming apparent that focus have shifted towards growing importance of social dimension and context in technological sciences and "restores focus to human actors in socio-technological assemblages without making them their sovereign masters" (Derksen, 2012). That means that collective intelligence created based on social technologies is increasingly salient as an object of study for the social sciences: sociality is becoming more and more something that people create technically. The instrumental, techno-scientific approach to social life is not the exclusive province of social scientists anymore; it demands all the more attention as an object of study (Mayer, 2009). The term "technology" could no longer be understood in its narrow sense as manufacturing processes and equipment necessary for production. Technical definition of social space is a broader concept and can be modified to the next level of technology that can be defined as a social problem in search for and implementation of the decision theory approach (Derksen et al., 2012). Müller (2011) noted that social technology term covers many other terms in social science, as some authors use "social technique", "social pedagogy", "administrative technique", "technocracy", "socio-technique", "political science engineering", "planned society", "efficiency engineer", "social (economic) planning". In this book, the authors are consistent with social technology term and all its contents will be explained via this one single term. Derksen and Beaulieu (2011) analysed social technologies in the system of three vector (a) technologies from the social sciences, (b) technologies that consist entirely or predominantly of human action, and (c) technologies that depend on social interaction for their constitution. In their research, the authors discussed that such tools and technologies as the lie detector, behavior modification through operant conditioning, the "sleeping policeman", laws, constitutions, house rules, genetic counselling, military drill, standards, etc. are examples of social technologies. Over

time, the concept and terms for the concept move, as well as has moved the concept and term of social technologies. In explaining "social technologies", the authors would like to start from the point relevant to collective intelligence processes, which are axis of this book.

The concept of social technology was born in the light of development of communication and collaboration processes in society in dimensions of business, government and community, as well as in the process of interaction between them. In general meaning, collaboration can be defined as the communication of two or more people, who are interacting in order to reach the common goal. Thus, such definition does not reveal the essence of this social phenomenon. "Collaboration is not a trait possessed by an individual, but rather the consequence of a certain type of interaction; specifically, one that has interdependent functionality" (Scott-Phillips et al., 2012). Modern information technologies have brought into reality the necessity of adaptation to the fast speed of information sharing, creating and distributing among actors, located in different states or even continents. For the fulfilment of such high requirements, a large scale of various social tools and technologies are proposed to the market. Collaboration tools and technologies comprise an increasingly important part of the information and communications technology infrastructure in organizations, related to key areas such as knowledge management, process improvement, teamwork, and supply chain management (Weiseth et al., 2006). Though not only formal organizations (which were analysed by Weiseth et al., 2006), but informal organizations (which are basically intersecting networks of acquaintances formed around individual or, in other words, "social networks") feel the increase of importance of information and communication technologies, as well.

When thinking about Social Network (SN), people often misattribute the concept to Facebook, Instagram, Twitter or other online applications, even though SN are defined as groups of people surrounding individual, such as family, work colleagues, acquaintances. In the beginning of the 20th century, Georg Simmel (1858-1918) coined the term *social circles* relationships that exist between networks of people. Since then, the concept has matured and is used in a variety of disciplines. Nahapiet and Ghoshal (1998) note that "building richer, deeper and broader relationships can add social capital to the organisation and the people in it" since sources of social capital lie in the structure and content of the

actor's social relations and its effects flow from the information, influence and solidarity it makes available to the actor (Adler and Kwon, 2002). Social networks also affect the processes of innovation (Amara et al., 2004), creativity, creation of knowledge and intellectual capital (Nahapiet and Ghoshal, 1998), knowledge sharing, team learning (Van der Vegt and Bunderson, 2005), speed to market, new product success, and social appropriation of broad knowledge base, competence building, etc. Thus, current social networking theories could be used to improve the efficiency in organizations (Cross and Parker, 2004).

Thus, in the modern world collaboration tools and technologies are disengaged from the frames of organizational infrastructure and become easily accessible and affordable not only for business units, but also for governments and society. Such processes made the usage of the concepts of tool and technology very wide, but in some aspects not clear. According to Wikipedia, tool is any physical item that can be used to achieve a goal, especially if the item is not consumed in the process. The synonym of the "tool" may be such word as "instrument". The set of tools needed to achieve a goal is "equipment". Thus, the technology can be defined as the knowledge of constructing, obtaining and using tools (Wikipedia, 2013a). Technology in its technical meaning is a whole of production processes, tools, which are necessary to produce certain production, and involves general (the cultivation and adaptation of stocks) and additional (transportation, storage, control and documentation) manufacture processes (Vaitkevičiūtė, 2000). If this technological definition is transposed in the context of social sciences, it would be found out that collaboration or technology is a whole of collaboration process, including all collaboration tools and, in addition, all knowledge of their interaction. This means that the concept of tool is narrower and should be understood as a part of technology, which can consist of a number of different tools, which usage is concerted and meaningfully placed into consistent process or the interconnected set of it. Furthermore, the concept of collaboration tools and technologies must be supplemented with support of information technologies in order to reveal the importance and modern value of innovative collaboration.

Information technologies based innovative collaboration mentioned above is often referred to as e-collaboration. As a new term is introduced to this discussion, here, the definition of e-collaboration should be shortly described. The term e-collaboration is increasingly being used

in industry to denote collaboration activities supported by some form of information and communication technologies (Weiset et al., 2006). Electronic collaboration (e-collaboration) is collaboration using electronic technologies among different individuals to accomplish a common task. This is a broad definition that encompasses not only computer-mediated collaborative work, but also collaborative work supported by other types of technologies (Kock, 2005). In systematic approach, it should be easily noticed that the integrated concepts of e-collaboration tools and technologies can be changed into one of the most modern definitions of social technology, which was first mentioned at the University of Chicago by A. W. Small and Ch. R. Henderson around the end of the 19th century (Wikipedia, 2013b). Henderson (1895) used the term "social art" for methods by which improvements to society are and may be introduced; "social scientists are the ones who make predictions and social art is what gives directions". The term "social technology" has dual meaning (Li and Bernoff, 2011): as a term from its introduction was related to "social engineering" (Schotter, 1981; Sugden, 1989; North, Wallis, 1994; Nelson and Sampat, 2001; Nelson, 2002; Pelikan, 2003; Leichteris, 2011), and since the 21st century it has gained another meaning as a "social software" (Johannessen et al., 2001; Andersen, 2011; Duarte, 2011; Leibetseder, 2011; Bugin et al., 2011; Derksen et al., 2012).

The term "social technology" is defined as a set of potentially arbitrary effective social challenges refillable solution, ways to achieve the intended results, doing social impact of human, social groups, different social structures" behavior (Alberghini et al., 2010; Bugin et al., 2011; Chui et al., 2012). McKinsey Global institute (2012) defines social technologies (ST) as digital technologies used by people to interact socially and together to create, enhance and exchange content. Social technologies is an interdisciplinary research field, which focuses on applying information, communication and emerging technologies to serve the goals of society. Further in the book, emerging technologies takes an important part of the topic discusses here, so it is important to note that "emerging technologies" mean those technical innovations, which represent progressive developments. The difference of social technologies from social sciences is the usage of "hard" technologies for solving society problems. "Being social is a feature, not a product. Almost any digital technology can be made "social" through adding the ability for people to connect, comment

or share. In the realm of economics, most economic activity ultimately rests on interactions between individuals, so almost any activity can be "socialized"" (McKinsey Global Institute, 2012). Other authors (Helmer et al., 1966; Alberghini et al., 2010) define social technologies as any technologies used for social purposes or with a social basis, including social hardware (traditional communication media), social software (computer mediated media) and social media (social networking tools). Chui et al. (2012) define social technologies "as digital technologies used by people to interact socially and together to create, enhance, and exchange content". Social technologies distinguish themselves through the following three characteristics (Bugin et al., 2011):

- "are enabled by information technology";
- "provide distributed rights to create, add, and/or modify content and communications";
- "enable distributed access to consume content and communications".

Social technologies include a wide range of various technological instruments that can be used by people, private or public sector organizations, or as an interaction tool between them. They include many of the technologies that are classified as "social media", "Web 3.0" and "collaboration tools" (see Figure 1). In Figure 1, neither specific collaboration tool nor technology is associated to any of the purposes: profit (represented by "E-business tools" in the figure), public service (represented by "E-government tools" in the figure) or social interaction (represented by "E-community tools" in the figure); as allocation of tools and technologies along one or another of the purposes is only relative regarding the main purpose intended for the tool or technology. As all tools and technologies mentioned in the diagram are intended for social collaboration, it means that they could be used for any of the mentioned purposes.

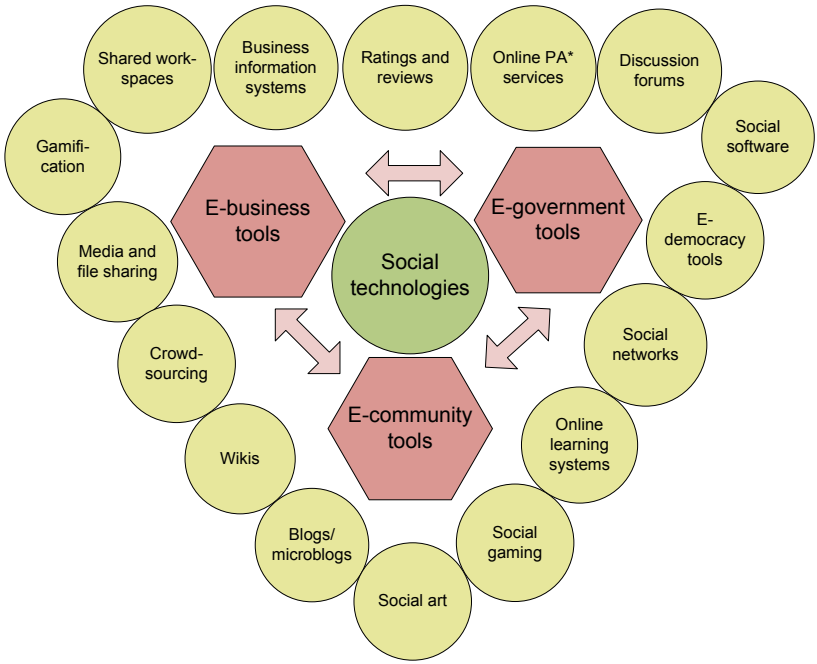

Figure 1. Social collaboration tools and technologies

Source: Skaržauskienė, Tamošiūnaitė and Žalėnienė (2013)

All these types of social technologies can be described in terms of three dimensions (Johannessen et al., 2001):

- Richness: "the ability to convey verbal and nonverbal cues, and facilitate shared meaning in a timely manner";
- Interactivity: "the extent to which rapid feedback is allowed";
- Social presence: "the degree to which virtual team members feel close to one another".

In the Johannessen's three-dimensional aspect, social technologies serve as sample technologies for knowledge management (KM) in aggregation of collective intelligence. Sample technologies for KM were presented in Evans and Ali (2013) IOSAEC knowledge management life cycle. Sample technologies were assigned to each stage of KM life cycle: identify, organize/store, share, apply, evaluate/learn and create. As some technologies are more universally adaptable, quite a few of them

overlap between stages (see Figure 2). The stages presented by Evans and Ali (2013) (which they organized according to gradual development knowledge transformation in KM process) could be organized according to social interactivity necessary/possible during the process. In such case, conservatory (identify, organize/store, create) and collaborative (share, apply, evaluate/learn) knowledge stages appear. In each of these stages, social technologies might be used for its purpose. The main difference is the complexity of social technologies required: different technologies may be better applicable for conveying data-information-knowledge, while others are better suited for convergence-related tasks, such as making decisions. For example, "e-mail facilitates well the fine-tuning and re-examination of messages, but richer synchronous technologies (such as videoconferencing) are needed to resolve differing viewpoints among team members and to develop a consensus for decision making" (Montoya-Weiss et al., 2001). Collective intelligence aggregation is mainly a management of tacit and explicit knowledge for a specific purpose. As Tsoukas (2005) noted, "tacit and explicit knowledge ate two sides of the same coin". The management of explicit knowledge is driven by tacit knowledge. This is where not software per se, but social technologies (in the sense that has been discussed so far) comes in hand. The construction of social technology is via expression of knowledge to organize the unexpressed knowledge. In social technologies, Tsoukas's (2005) double-sided coin is fulfilled.

The definition of social technology is characterized by multiplicity and the concept is not defined unambiguously. Currently, social technology term is lacking interdisciplinary. Even though researchers more often talk about social technology being the object of social sciences rather than any other, but it is just as important as to humanities or biomedicine sciences. In order to this, scientists from all branches of science should be involved in drawing a comprehensive concept of social technologies.

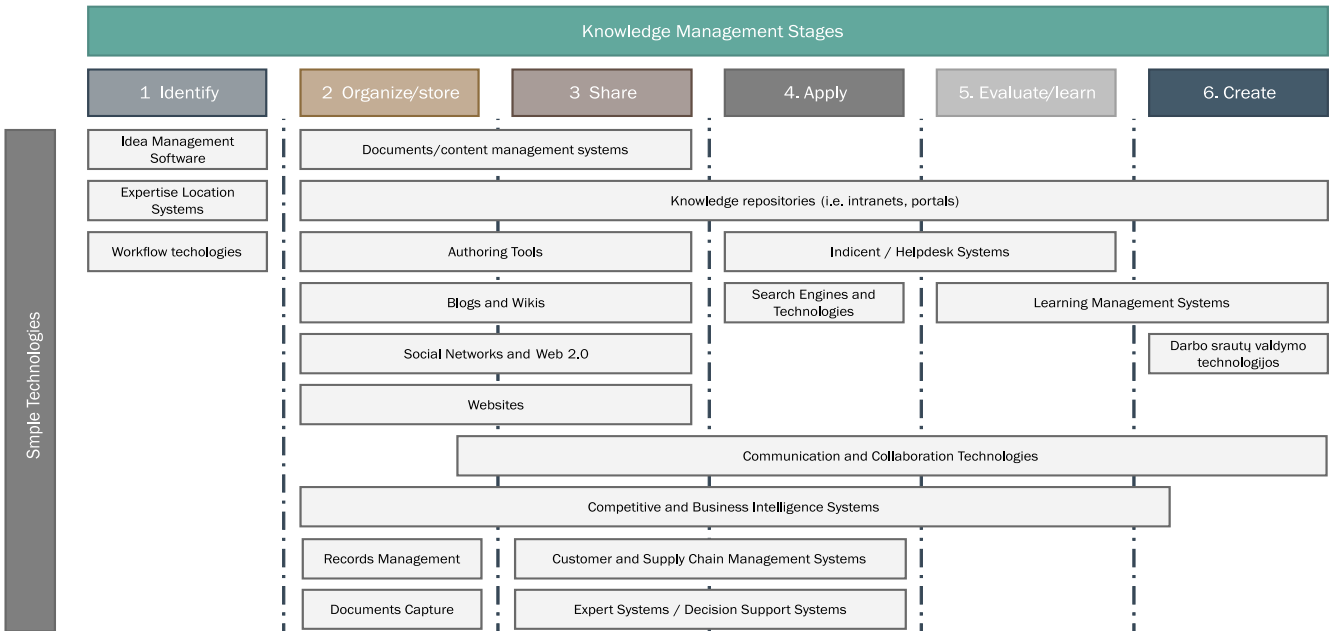

Figure 2. Sample technologies in knowledge management stages

Source: Evans and Ali (2013)

It can be concluded that the current function of social technology is for social purposes via digital means. At its most narrow sense, social technologies can be understood as information and communication tools that have a range of economic, social, cultural or other public life processes available to each person: computers, smart phones, social networks, etc. According to empirical research results (Skaržauskienė et al., 2013), users report benefits from the use of social technologies for various purposes: first of all, reducing communication costs, increased speed to access knowledge, decreasing travel costs, and increased creativity. Positive effects were mostly related to social technology as a collaboration or information/knowledge aggregation tool, as in this case it was taken as a tool helping to assure efficiency of the processes in collaboration, while negatives rose from social technology as a social networking tool with the agenda of personal data privacy or face-to-face communication skills.

The real power of social technologies is only started to be understood. "Its power steams from the innate appeal of interacting socially, pleasure and intellectual stimulation that people drive from sharing what they know, expressing opinions, and learning what other know and think" (Bugin et al., 2011). Despite rapid application of social technologies, much more lies ahead. Today, more than 80 percent of the world's online population is interacting via social networks on a regular basis, but 65 percent of the world population – 4,6 billion people – still lacks internet access (McKinsey Research, 2012). For Google Executive Chairman Eric Schmidt (2013), "Everybody in the world will be on the Internet within seven years". Networked society noticeable transforms in terms of sociability. Castells (2005) observed trends that face-to-face interaction is not fading away and individuals are not isolated in front of their computers. Opposite trends could be observed with Internet users being more social by having more contacts, friends and being more socially and politically active than non-users. Accordingly, new forms of wireless communication (e.g., mobile phone) substantially increase sociability, particularly for the younger people. As it has been seen in early use of social technologies, when these ways of interacting are applied to commercial and professional activities (e.g., developing and selling products, working together to solve a business problem), the resulting value creation is impressive (Chui et al., 2012). Klososky (2011) analyzed social technology role in business organizations. He even used a special term, *enterprise social technology,* by

referring to computer programmed collaboration platforms and related online tools (such as online rating systems, microblogging, etc.). Social technologies – "the computer code and the services that enable online social interaction – are, essentially, the product of 40 years of technology evolution and the fulfilment of a long-held vision of what computers and digital technology could do" (Chui et al., 2012). In their research, the authors also state "that the Web's growth in reach and capability, and as a medium for interaction, set the stage for the explosive growth of social technologies". Leibetseder (2011) with her research contributed to the more scientific rather than practical view on social technologies by defining them as "applying the use of social science theories and methods implementing related technologies for specific purposes especially social ones: to ease social procedures via social software and social hardware, which might include the use of computers and information technology for governmental procedures, etc.". Social technologies unleash creative forces among users and enable new relationships and group dynamics. In the hyperactive world, people can feel immediate benefits in connecting with the right peers, getting answers to questions and finding information. The Millennials, also known as the Millennial Generation (Generation Y), are people born between 1980 and 2000 (Alberghini et al., 2010). Social technologies are becoming the preferred method of communication of the new generation; and communication styles are evolving into a more collaborative approach (Alberghini et al., 2010). According to Forrester analysts De Gennaro and Fenwick (2010), there are key trends that will make the inclusion of social technology in society life a necessity. These trends are the physical distance between teams and the entrance of Millennials into the workforce (De Gennaro, 2010). These new employees bring very different needs, experiences and expectations to the job and often meet a seasoned workforce that has very different work styles (Schooley, 2009). New technologies allow people to raise questions, share knowledge and ideas, and discover people skills regardless of hierarchy. According to Koplowitz and Owens (2010), such tools help "to break down organizational and cultural barriers such as time differences".

"In the future, people will spend less time trying to get technology to work […] because it will just be seamless. It will just be there. The Web will be everything, and it will also be nothing. It will be like electricity. [„„] If we get this right, I believe we can fix all the world's problems" (Schmidt, 2013).

According to McKinsey Global Survey, "Americans spend approximately 11 hours a day communicating or consuming messages in various ways, including in-person, watching TV, reading, and using e-mail" (Chui et al., 2012). According to estimations by Gore (2012), the number of people connected to the Internet globally doubled between 2005 and 2010, and in year 2012 it reached 2.4 billion users globally and by 2015, there will be as many mobile devices as there are people in the world. The perceived value of being able to connect to the Internet has led to the labelling of Internet access as a "new human right" in a United Nations report (Gore, 2013). Just as e-mail and instant messaging replaced the phone call, social technologies could have a similar effect in changing communication dynamics (De Gennaro, 2010). "Freed from the limitations of the physical world, people are able to use social technologies to connect across geographies and time zones and multiply their influence beyond the number of people they could otherwise reach" (Bughin et al., 2011).

Social technologies have the potential to affect positive change in communities and governments. Such technologies can be disruptive to established corporate and governmental power structures as happened, for instance, during the Arab Spring 2011. The use of technologies enables individuals to connect on a different scale and to create a unified, powerful voice acting as consumers or entire societies that can have a compelling impact on dialogues with corporations and governments (Bugin et al., 2011). According to Norvaišas et al. (2011), "[...] a multitude of business, administration, communication and other processes are digitalized thus placing them in a huge network, organizations need a system which would enable analyzing people's opinion and finding the best solution regarding the development of new products and services". Social interaction via technologies is a powerful way to efficiently organize knowledge. "Glocalization" may provide an answer why the same effect is valid to culture, economics and political power. Wellman and Hampton (1999) coined this concept in a connection with growing importance of Internet tools and online communities. In the literature, the term tends to be used to refer to the phenomenon of Internet enabling communication worldwide and at the same time enhancing local social networks. Researchers explain this phenomenon by emphasizing that communities are social networks, which are not defined by physical closeness of members involved, but more by social closeness. Individuals can switch between communities and

social networks due to the high-speed communication of the (mobile-) internet (Wellman and Hampton, 1999; Wellman, 2003; Wellman et al., 2003; Hampton, 2010).

The application of social technologies in organizational management has become crucial for success in network society. Nevertheless, over the next few years, the emerging "social technologies" of Web 2.0 and Web 3.0 are likely to transform the management. "Web 2.0 is an amorphous term used to define a computing paradigm that uses the Web as the application platform and facilitates collaboration and information sharing between users' (Lykourentzou et al., 2011). Social technologies enable organizational interactions to take place online with the scale, speed, and economics of the Internet. Virtual networked teams have made management more efficient, because they are reducing the costs of communication, collaboration and coordination. McKinsey's fifth annual survey on social tools and technologies shows that when integrated into the daily work of employees and adopted on a large scale throughout a new kind of business – the networked enterprise – they can improve operations, financial performance and market share (Chui et al., 2012).

Social networking capabilities are providing vital information in a way that is adaptive and user-driven. However, all these technologies have limitations that can easily lead to misinterpretation, as with the lack of non-verbal communication, they are not capable of providing the same quality of communication as eye-to-eye interaction. "Because of delays in transmission and the lack of social and nonverbal cues, communication technologies can interfere with open communication, knowledge sharing, and the ability of teams to identify and resolve misunderstandings" (Cohen and Gibson, 2012). Other limitations of networked communication in an online environment include the following cases: danger of slow response, weakening of hierarchical authority, lack of responsibility, data leak, unclear problem/orders/technology, and dependence on technology (Tamošiūnaitė, 2013). Old generations tend to be skeptical about social technologies. Therefore, it is important to implement something useful, to monitor the user engagement and to educate the community about using social technologies (Allberghini et al., 2010). Online collaboration, in its current state, is not a very good substitute for the sort of unscripted, face-to-face interactions that are critical to producing genuine breakthroughs. Moreover, complex coordination tasks, like those involved in the design

of a new aircraft, still require a dense matrix of "strong ties" among critical contributors, rather than the "weak ties" that are typical of web-based communities (McKinsey Global Survey, 2012).

Gladwell (2010) argue that online connections are inherently weak and often temporary because they do not support the stronger relationships. In Egypt (and also in Libya, Syria, Bahrain), the same pattern has unfolded an emergent reform movement powered by a new collective political consciousness born on the Internet has stimulated change, but failed to consolidate its victory. Technologies empowered citizen to e-participation, but all governments use technologies to defend their interests, as well. The victories of communities to "reprogram" national politics are not permanent "because the power holders in the network society" will do everything possible to "enclose free communication in commercialized and policed networks" (Gore, 2013). Though the digital commons played a vital part in facilitating the Arab spring, it is less clear how it will contribute to Arab democracy (MacKinnon, 2012). "Just because everybody can now create and transmit media does not automatically mean that human society will be more democratic and peacefully [...] Movements to create an ideal society through the creation of online communities led by charismatic leaders with utopian visions claiming to transcend all of the political ambiguities are more than likely to produce Internet-age versions of the same problems that caused tremendous human suffering in the twentieth century" (Gore, 2013).

Growing access to information online raises questions about free expression on the Internet, which can be shaped by various factors and policies. Exploitation of new media forms should not compromise civil rights, such as freedom to education, expression and most importantly – privacy. UNESCO published a pioneering standard-setting report on Internet freedom titled "Freedom of Connection – Freedom of Expression: The Changing Legal and Regulatory Ecology Shaping the Internet". Access (also known as AccessNow.org), an international Internet advocacy group dedicated to an open and free Internet, published a summary of the charter's ten core principles ranging "from universality and equality, accessibility, and rights and social justice to diversity and network equality".

The use of social technologies can also carry mental health risks. The deeply engaging and immersive nature of online technologies has led to the addiction for some people. "The Diagnostic and Statistical Manual of

Mental Disorders (DSM)" was updated in 2013 by including "Internet use disorder". According to the estimation by Gore (2013), there are 500 million people in the world, playing online games at least one hour per day. And it is not just young people: the average online social games player is a woman in her mid-forties. Worldwide, women also generate 60 percent of the comments and post 70 percent of the pictures on Facebook (Gore, 2013). Shocking results of a survey by Ericsson (2014) revealed that 40 percent of smartphone owners go online immediately after waking up.

Chui et al. (2012) and other researchers from McKinsey Global Institute, working in the field of social technologies, identified several risk groups: "employee time spent "chatting" about not work-related topics on internal or external social networks or using social media to attack fellow employees or management", different risks related to consumer privacy, information security and data security. The use of mobile communications devices by driving, for example, could be dangerous for public health and safety. These risks could limit the ways in which social technologies can be applied. Also, "censorship and restrictions on Internet use stand in the way of value creation by companies that hope to enable consumer to interact with them and that wish to harvest deep insights from social data" (Chui et al., 2012).

Social technologies enable more and more users to become a part of global conversation, creating their own content rather than just consuming it. However, the quality of user-generated content varies dramatically – from excellent works of journalism to spam and even abuse. Wikipedia is often showcased as a great example of collective work, but it does face a number of problems, such as vandalism and stemming from users whose individual objectives differ substantially from the typically observed ones (Lykourentzou et al., 2011). In addition, Wikipedia suffers from participation inequality, meaning that the ratio of active contributors vs "lurkers" is minimal, i.e., 1% of total users contribute (Charles, 2006; Nielsen, 2010). This may be explained by lack of rewards (e.g., financial motivation) for contributions and limited expertise and time resources of users (Lykourentzou et al., 2011).

The users are not rewarded based on, for example, financial rewards, but instead, their individual objectives lie on the self-fulfillment that they receive from their contributions. This may be explained by the fact that not all users may have the time or expertise to contribute to an article

Bauerlein (2008) argues that the very disintermediating power of social technologies has reduced the overall quality of discourse. Carr (2010) argues that the short-form content made me available through social technologies is making people less able to digest large and complex amounts of information. The opposing view is that even the existing means of content selection did not ever assure quality, that the diversity of opinions is healthy, and that if people can learn social media literacy, access to a broader set of opinions can actually promote critical thinking. A related danger is technological determinism: the belief that technology can be used to solve problems which roots ultimately lie in human social and ethical behavior (Gore, 2013).

Discussion about social technologies potential ought to be a possibility to address the following question for future research, through fundamental conceptual reflections and empirically oriented contributions: which social technologies are most important in the current social environment? How can we study them? What is the future of social technologies and network society, etc.?

1.3. Historical Time and Technological Projects

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It is to be noted at the outset that it is impossible to offer an all-inclusive, universally acceptable "social theory". The evidence for this claim does not come from some critical view concerned with the failures of social theorists, but from the theorists themselves. If the claim that civilization is the broadest social unit, offering explanations of all events, is accepted, then it must also be accepted that sociologists, engaged in the study of civilizations, are in disagreement as to the nature of a civilization and, in face of the fact that there are more than one civilization, no agreement can be reached which among them should be regarded as a universal standard. There is an agreement that each civilization has its own standards, different from others, and thus, no universal social theory is possible. In addition, if a social theory is proposed by members of a given civilization, then such a theory rests on the context of understanding of such a civilization, and thus, it is incapable of encompassing its own and other civilizations. And

yet, most distinct and even ideologically opposed publications – journals, monographs and media reports – continuously mention "globalization" in two major senses: economic and technological. While the former is attributed to the power of global players that determine the destinies of local governments and even the structures of societies, it is the latter that has become the leading edge of everything associated with progress.

Given that there is no universal social theory, it is possible to revert to universal "praxis" that, despite different civilizations, societies, cultures and life worlds, all accept the global requirements of technology and progress. By doing so, they also must accept the theoretical basis of technology and progress that are founding aspects of modern Western civilization. Thus, in the practical sense, it must be admitted that globalization has become equivalent to the acceptance of modern West as the universal practical horizon with its background theory. We are cognizant that various civilizations, much earlier than modern West, had developed extremely sophisticated technologies – one case is China – yet what allowed the West to become preeminent is its theoretical/philosophical base. The latter also founds the social and political order of the West that includes educational systems intertwining theory, praxis, civil society, economy and public participation in political affairs. It is well known that not all civilizations and even cultures within them possess a public domain for the participation of all social members in making public decisions, having rights and duties to change laws and public representatives, and establish educational programs for younger generations. And yet, even such civilizations accept and compete for technical innovations and progress – immersing in one major aspect of modern West.

Theory of Praxis. It was suggested that there is no one social theory, specifically in light of an encounter among various civilizations, yet it is also obvious that the prevalent global trends have one common denominator: *praxis*. In this context, there is currently an abundant literature offering a basic claim that diverse philosophical schools are converging toward a conception of practical activity and basically of praxis. This convergence has a tendency to assume that human activities are embedded in an intersubjective and historical horizon of sense comprising the lived world of a society. Such offers of convergence on the basis of praxis, and more generally, of practical activity, cannot be taken for granted at face value. There is no consensus among the various directions concerning

the meaning of the lived-world, intersubjetivity, horizons of sense, social world, forms of life and action, etc. In addition, the emphasis on praxis continues to assume silently that it offers an overcoming of metaphysics in favour of human understanding and specifically of human social life world. The latter is precisely what humans make and how they act in relationship to the environment and to each other. It is to be noted that by the middle of 19th century, there was a common premise that, ala Kant, the things in themselves, i.e. reality, are unknowable, and what is knowable depends on the ways we organize the world of awareness. Indeed, the principles of philosophy were discarded and the notion of theory was not to "interpret" the world one more time, but to change it. This means that any theory will count as valid if it will serve practical affairs, practical human needs, whether at an individual level, as is the case of American pragmatism, or at the grand social level, as seen by Marxism. In this sense, any theory does not depend on what it offers as an understanding of reality, but what value it has for human needs.

This means that any understanding of social technology presupposes this modern Western conception of theory as a value laden instrument for human requirements. The above mentioned fact that not all civilizations and the cultures and societies within them contain a public domain that would allow the participation of all social members rests on the question of social technology: who is to decide what technical needs are of social value; is it the general public or the "leaders" with the advice of "experts" of all practical domains, from bio-chemistry to weapons. This is obvious in the process of globalization that creates various selectivities by "authorities" who are intent on "protecting" the members of their communities from unacceptable influences. On the other side, there is a proliferation of "anything goes", i.e., if we can make it let us make it. Of course, the public is immersed in all sorts of miraculous promises from "rejuvenation" to cures of all disease, to becoming rich and, in fact, saving the world from poverty. This is evident from the engagement of European Union with a 2015 project to eliminate poverty around the globe – and all premised on social technology.

It is assumed that Western modern technology is based on what is regarded as "science". The latter consists of theoretical/philosophical base that comprises an effort to discover universal laws of all phenomena – laws that are not affected by time and space and, above all, are free

from traditions and their historical customs. With this position, what was considered to be valuable and valid was swept aside and a "new beginning" – the age of scientific enlightenment – was declared. The phenomena that science was and is concerned with are of a very different kind than the phenomena which are encountered in daily experience. The general term used for scientific phenomena is called "materialism", inaccessible to perception, yet deemed to be the underlying condition of the experienced phenomena. Major characteristics of the matter are its homogeneity, extension in space and located in a specific temporal position, and finally, it is divisible into its smallest components – the atoms, of which everything is composed. Such characteristics are accessible to the modern scientific method – mathematics, leading to the conception that the only valid way to deal with material reality, and with any phenomena, is quantification. The contemporary preoccupation with mathematics, as a basic necessity to be scientific, is one result – the other result is its variant – statistics. Qualitative experience by which humans live is excluded from science as being subjective and unreliable, even if needed to explicate scientific data to mere mortals, such as us. Yet, it is also clear that a new beginning introduced a new designation of man – historical and self-made subject, who is not part of the material domain.

Of course, scientific treatment of this subject requires its reduction to the material domain (whether it is physiological, biological, chemical, genetic) and thus explainable by material causes. Up to date, there is no philosophical resolution as to the feasibility of such reductionism, yet scientific journals are replete with all sorts of statistical data attempting to show that we are, at base, material. This shall be discussed subsequently when dealing with various technologies affecting human life in intimate ways. Meanwhile, while this subject was a creator of science, it also became a creator of a new kind of history, based on human projects and needs, the fulfilment of human self-determination. The new history is premised on the supposition that material reality, functioning on the basis of causal laws, has no history, and resultantly, the only entity that has purposes, aims, plans and projects is the human as a subject. To decide what sort of subject it is requires a reconfiguration of what is history that this subject constitutes and how it is inevitably coextensive with social technology. Here, the ultimate version of modern West with its "ultimate purpose" is encountered: the subject, by creating its historical world, creates himself.

The two ideological camps, despite their superficial differences, point to the same basic premise: the human, on the basis of technological progress, will become a total master of his destiny.

Yet, we are not clear concerning the emergence of the material world that science accepts as obvious, and the use of it as a ground for the mastery of the environment. While there are numerous theories purporting to account for the explosion of technology in Europe and West, here the concern is to disclose the basic principles – ontological and metaphysical – that are taken for granted by modern sciences and their technological creations. Greek philosophical debates brought to light a fundamental ontological issue concerning the basic component of reality, such as a substantial entity that can be either an aggregate of parts, like barley and wheat in a barrel, or it can form a unity. If the substance is an aggregate, then it cannot possess characteristics apart from those of the parts. If it is a unity, then the substance as a whole must possess attributes qua the whole. The attributes of the latter must be more than the sum of the attributes of the parts. For example, water, as a substance, possesses a qualitative attribute of being wet; the parts of which water is composed, hydrogen and oxygen, are not wet. They possess their own attributes. The aggregation of the parts should then be equal to the whole, and the latter should be equal to the sum of the parts and their attributes. Since these elements do not possess the attribute of wetness, then their aggregation, to form water, should not possess wetness. In this case, the whole is equal to the sum of its parts and their attributes. This means that the basic ontological component of the universe would be the part and all things would be equal to the sum of the parts. But in this sense, the attribute of wetness of water is an ontological mistake. Wetness would have to be attributed to the "mistake of the senses". If one had a keen sight of Lynkeus, one could see right through wetness and recognize the basic reality as hydrogen and oxygen without any trace of wetness.

While the problem is complex and has not been resolved up to date, the modern philosophical decision favored the concept that reality is composed of "atomic" parts or, what is called metaphorically, the "building blocks" of all things. In this sense, there are no essential differences among things, since at base they are different aggregates of atomic parts. The difference between things is their size, weight, density and location in space and time. The only appropriate method to deal with the "homogeneous" sum of material parts is mathematics, since the latter

can be used to calculate the material sums, their locations in space and time, the speed of their movements, and predict the results. In turn, one can calculate the material results, and calculate and arrange the material parts that would yield the results – the one's we ourselves want. Thus, what possible material conditions can be established to achieve possible projected results? This is the ground of what has become called the "instrumental reason". In principle, anything can be made into anything, and the more material results are achieved, the more these results can be used as means for other projected results, thus constantly increasing our controls and mastery over the environment. Such an increase of technical production and reshaping of our surroundings is called "progress". Hence, when Europe/West transfers whatever technology, it also transfers an entire modern Western ontology and its mathematical method which is also technical. The danger lurks in the increasing treatment of humans as material (at times elevated to chemical and biological sums of parts), to be reshaped by the latest bio-technology. From this arise diverse technical expertise, each capable of producing what it can calculate mathematically. The "education" of technical experts is now global, creating both a nomadic civilization and a widening gap between rich and poor.

While this process requires the adherence to its principles of formal and material detachments, it "progresses" toward a differentiated inclusion of all events, both "natural" and cultural, and thus constitutes a formally differentiated world where semi-independent spheres call for semi-independent functions and "work". What is relevant in human life depends and is contingent upon the manner in which the formal constructs divide the human "material": the human is an economic, social, chemical, physiological, psychological, biological, etc. set of differentiated "behaviors", each semi-independent of the others. It would be redundant to analyse the obvious: the "power" of these differentiations comprises also the separations of social functions and tasks, leading to a society of semi-independent groupings of "expertise". Yet, what each expertise produces within its own sphere has no necessary connection with other spheres. Hence, the results of "research" in a specific domain can be picked up by military or by art. For the experts of each domain, there is no recourse to any external criterion concerning which would correlate the results as possibilities in another domain. This is to say, the material, i.e., technically produced forces, can be selected at will, arbitrarily by

other social domains, such as politics, for possible "application". The lateral differentiation decentralizes responsibility, thus increasing the contingency and arbitrariness, and the latter is increasingly unchained from any constraints. Every formal rule, and every material result made to fulfil a formal design, becomes totally arbitrary, offering possibilizing formal and material combinations without end. Each domain is released from the concrete lived world implications, each an "expert" in its own sphere need not relate to any other sphere; each can claim that there is no such thing as "conclusive" evidence precisely because the formal systems and their fulfilled material arrangements are arbitrary designs and carry no necessity; they are, insofar as they make, and with the making they produce, their "reality" and hence increment power and "prove" their momentary success.

It would be redundant to speak of "needs" since the latter are part and parcel of the possibilizing procedures and become at the same time needs and fulfillment. We can make it, therefore, we want it, and we wanted, therefore, we can make it. Thus, the process of increased contingency and arbitrariness, as sources of power, comprises a self-referential domain. This means that there are no restrictions for the "search for truth". After all, such a search has lost any boundary and any distinction between knowledge and object. Even in social understanding, the relationship between the formal and material processes are determined by "science", i.e., its very self-articulation and production. One, thus, cannot find any trans-scientific criteria to check this process. And each domain has no built-in reason to stop the proliferation of its own form of knowledge and praxis. There are no physical reasons to cease making more physical experiments and refinements, no economic reasons to stop the economic "growth", no biological reasons to stop re-moulding the living processes along new combinations through genetics, etc. Limitation would be regarded as an infringement on the "autonomy of research". Any science, which would proclaim that it has become complete, would cease to be a science in the context depicted above. The same thing with is with needs, the more our technology invents and produces, the more we need what we have invented. In this sense, while economy might fund this process, the latter makes economy possible. In brief, we cannot stop progress.

Progress must be without regression, without death, and all formal systems and all transformations of the lived world into technically remade

world are enhancements, maintenances of this permanent structure. What is peculiar about progress is that it has no "subject" that would progress. It must be recalled that for modern philosophy, despite various surface claims concerning human nature, the sole objective reality is basically a sum of material parts and humans are no exception; at this level, humans cannot claim to be essentially different from all other material events. In this sense, humans are also a function to be calculated within the context of various formal systems and their ability to design a new man. All formal systems as rational are instrumental, such that a positing of a specific aim requires calculation of material means for the attainment of such an aim. Yet, the attained aim will become material means for other aims, while the latter will also become means for further aims – but without any final aim. In terms of instrumental rationality, progress cannot have a final aim and hence, it cannot have a direction. Its aim and its subject is itself, and thus, it is self-referential. Progress is its own destiny. It constitutes its own increasing formal refinements, efficiencies and "improvements" without, of course, attaining perfection. No attained construction is left without possibilizing and, hence, "improvement". In this sense, one could say, semiotically, that the signifier and the signified are one.

What is immediately notable is the disproportion between the subsystem called science and the rest of social life world. The efforts by the theoretically-methodologically designed systems to master the material nature have become exponential. Let us be clear about this: there can be only one domain of progress, and this is the coded and formalized transmission of practices or techniques. A society can increase its mastery and practical control through the increase of formal differentiations and physical interventions in the environment, yet it cannot increase what the environment as a whole has to offer. There is no "progress" in nature. We cannot increase material resources, but only the efficiency of their uses. Only the latter can progress. And this is precisely the point of crisis: the sciences are entering human life on the basis of this use, i.e., making humans function in accordance with the very prescripts that are imposed on the presumed physical world. Thus, the question arises: is this a progress for human life, or is this the arbitrary treatment of the human, and hence, the subsumption of the human under arbitrariness and its opening up of power over the human? Obviously, the "use" and interference is inherent in the processes of modern science, requiring

valuation which can connect the formal and the material. The human then is submitted to and subsumed under an arbitrariness which includes his own operations. That is, the human also functions in this modern valuation and treats, or at least is exposed in principle to treat, everything arbitrarily, i.e., violently. There is hardly any need to speak of the currently raging global debate about global warming and the degradation of the environment. Arbitrariness is a "power" which opens an initial experience of violation. But this violation cannot be avoided within the context of modern understanding of theory as praxis, method and their application. It is no wonder that almost all post-modern writers, following Nietzsche, claim that power is inherent in all our discourses and all our relationships.

History. In their common work, sociologists as well as historians do not ask what time is. Although this question may be asked with total directness, it cannot be answered with such directness. On the other hand, the danger is great if one does not critically reflect on this question, leave it open and think in simplistic terms such as the metaphor of river or a clock or a calendar. Such notions of time are at best abstract, having no capacity to determine which of the temporal points are past and which are future. It is simply an indifferent quantity. It is necessary to reflect on the question of time as it is understood in contemporary social setting – not just in the West, but globally.

To speak with any European researcher in just about any field is to speak with a historian. The common position is historical, and every asked question will be treated historically. This is in sharp contrast to North Americans for whom history is part of civic requirement in primary education, but without any serious bearing on what we do. But the conception of history in Europe is no longer some sort of a continuous line of progress toward an aim accepted by all. Historical time is distinct from the assumed scientific time, having a linear direction from past to present to future, and the mythological time, which belongs to various religions, having a final purpose, and ruled by some image of eternity. History is an efficient consciousness, at the outset comprised of horizons of past-present-future which are not one after the other, but an overlapping field. The latter is constituted by human activity which has its ground in engagement with tasks, having multi-dimensional vectors. When building something, the past is not yet gone because it is a horizon wherein the required materials, training, and building rules are given and

are coextensive with the accomplishment of the task. It is also the case that the future is not what is to come, but is co-present in the task, such that the activity reaches toward selected possibilities coextensive with the task. Such possibilities overlap with the "past" horizon by signifying what is needed and where it is to be found. Each action, engaged in a concrete task, occurs within a time "dimension" where the "coming future" and the "vanishing past" are co-present as a fluctuating horizon. "I shall need a hammer tomorrow which I saw yesterday in a tool store." This is not to say that the theoretical, linear time is rejected; rather, it is one aspect of the field wherein its value is assessed.

If history is made and arises through human action, then the existential being of contemporary humanity is the very history it makes and the dimensional time which is coextensive with its actions. The human is not distinct from his history, and thus, he is coextensive with history. This is the fulcrum on which all modern theories of explaining history either objectively or subjectively crash. Thus, all that was once called nature, premised on the theoretical time, arises only as phenomena deployed and articulated within the tasks of dimensional time embodied in human action. Even if we investigate facts (without being clear what constitutes a fact), their characteristics and relationships, we will find them in a system of orientations, where every fact signifies others, and the latter signify other "facts" as having meaning orientations. This suggests that each natural and historical event functions within the dimensional time, specified by significative implications of the horizon of such events. Thus, historical events, as humanly constituted, are not connected causally but as signifying their horizon. The horizon contains the "memory" which does not include some total past, but is selective of what is relevant in current action's "future". Indeed, causality appeared in a specific theory as part of Western history, such that without the horizons of such history there would not be the concept of causality, as one vector in the dimensional time. After all, to speak of causality scientifically is to assume that it is possible to "predict" the events of the future which, after all, is not yet and thus belongs to a horizon of awareness of what is "possible".

At the outset, it must be obvious that it is too simplistic to assume a one dimensional, linear advancement of relationships between the complexity of social system and temporal horizon. The growth of more complex social systems does not have a more complex history; rather,

on the basis of the complexity, they neutralize history, illuminate it by differentiated selectivity and, in many cases, reject its lessons. When history becomes relevant in more complex societies, it becomes at the same time contingent, it becomes memory and forgetfulness, detailed interest and indifferent neglect of a conquered past; all these coexisting possibilities is the situation which correlates to the complexity of the system. Although it is already obvious, it will become more so with the introduction of the question of social technologies and their role in constituting complexities and, in turn, managing of complexities. But first, let us turn to the ways that the dimensional time is the dynamism of intersecting social factors. Such intersections provide positive reflexivity as a context for social actors and their tasks.

Not all events play a role in human activity; they are selected in accordance with their significance and definition they assume in a context of a given task and a selected possible purpose in a horizon of other numerous possibilities. In this sense, the horizons are also given selectively; significant possibilities are selected and currently insignificant are pushed to an amorphous background. This selectivity of events accounts for the historical continuity without the assumption of linear time. Although the process of selectivity may leap over some events, other processes will continue to maintain some events as still significant, and thus, in this overlapping, the continuity of history is maintained within the dimensional time horizons. The horizon does not disappear, although it might contract for some activities and expand for others, depending on the tasks – the building of history. It is not assumed that the expansion of the past horizon will, somehow, encompass the entire history, with all that has been built and is relevant for today. The mentioned example of China's extraordinary achievements in technology does not mean that its entirety can be captured, since each technical product not only shows its use, but also has a horizon of its own, including the craftsmen, their acquisition of skills, their ability to select materials, and the social needs that would prompt the creation of such implements. In turn, the future horizon, with some selected set of possibilities, may disclose some previously overlooked event's significance, and thus broaden the horizons of both past and future as overlapping field phenomena. Such overlapping is the ground of social reflection, leading to social technological constructions.

Reflection is a process applied on itself or upon processes of the same kind. Such an application increases the function, efficiency and management of such processes. Social processes, which become reflexive in this manner, are subtended by a selective process of informational management. This selective process is the reflexive dimension capable of managing a complexity of contents by reducing them to their proper spheres and by using mechanisms of simplification at increasing levels of abstraction. Thus, for example, the choice of commodities for the consumer is magnified through a monetary mechanism (the possibility to exchange possibilities of exchange). The same thing can happen with power when power is applied to power where the power of one or various processes is placed at the disposal of another process.

Reflection. It is well known that modern history assumes a subject who, reflecting upon itself, devises methods and even philosophical interpretations of the environment that fits the devised methods. But at the same time, reflection posits such a method and an environment as science and reality and constitutes a historical world deemed to be objective and accessible to all. Within this accessibility, social events are articulated and interplayed as a horizon of temporal possibilities articulated so far. The temporal conditions for reflexivity are quite complex, although they can be managed by higher levels of reflexive inclusion. Thus, modalized aspects can be again modalized under more inclusive possibilities and wider horizons. One can discuss the possibilities of reality and reality of possibilities or even possibility of possibilities, necessities contingencies and so on. The complexity of the temporal condition of reflexivity can be characterized in the following way. There can be a present future which must be distinguished from the future present even if only on the grounds that the present future contains more possibilities than is possible for future presents to become reality. One must also distinguish between future presents, present presents and past presents, between the present of the past as history and the past present. If one begins with the two temporal horizons of the present, namely past and future which in each point can be seen as presents with their own pasts and futures with further possibilities of reiteration, then one begins to constitute the conditions for the possibility of all possible processes of reflexivity. This suggests that the indefinite modalizations of time horizons can be seen as temporal reflexivities in time. The immediate future can be reflected by a more remote future and both, in turn, by a still more remote

and perhaps encompassing future yielding the structure for the reflexivity of possibilities in possibilities. This process is the condition for any distancing from the present facticity and environment. It allows the positivisation of the environment, be the environment "material", "ideological", "juridical" or even "ethical". The judgment of current events, environment or facts is a judgment from a horizon of time and its possibilities, requiring, at this level, no hierarchical arrayment either of values or norms. This free ranging reflection of time in time and possibilities in possibilities is the condition upon which all reflexive processes are based. For present purposes, it is not necessary to deal with further complexities of time reflexivity as a condition for social reflexivity which may be institutionalized to allow the complexity and management of an indefinite multiplicity of social events. It is sufficient to say that such reflexivity allows the possibility for decision-making without being one of the interestladen social events, ideologies or juridical norms. They will be discussed later.

This process of reflexivity has a basic advantage over other processes. Dealing with justice and value, for example, cannot be based on "natural law", since that would necessarily limit the number of possible judicial decisions. The extreme expansion of judicial areas during the 20th century was accomplished only through positivisation and institutionalization of reflexive mechanisms enabling the management, under the judicial process and its ideological background, even extremely fluctuating situations and behaviors. The significance of the reflexive processes and positivisation does not lie merely in its temporal aspect of transformation of old norms and values into new ones, but also in the fact that such processes allow the restructuration of the content of norms and values. The same is valid for values; the reflexivity multiplies value viewpoints which must be taken into account during the process of decision. This leads to an increment of satisfaction of values through the employment of other reflexive processes.

With the increased complexity of social factors, positivisation and its subtending process of reflexivity are unavoidable. It is the only possible way in which complexity can be managed and also expanded. Hence, institutionalized reflexivity and positivisation offer greater opportunities for the establishment of greater number of norms and values. Of course, the complexity should not be multiplied to such an extent that it would surpass the capacity to manage information. To guarantee that such an event is avoided, the process of information must become reflexive and

hence positivised. That this reflexivity is already institutionalized is obvious from the fact of the objective studies of languages, information systems, communicative capacities and even pre-linguistic gestural behavior as informative. The question which emerges is the following: what are the conditions for the possibility of the process of reflexivity and positivisation? Everything must be understood temporally, in a process, and hence, from a perspective of sociohistorical variations and even radical breaks. As will be seen subsequently, such a temporalization of all social factors toward history introduces a concept of theory which is no longer merely explanatory but, above all, practical and critical. In brief, the foundations of the critical theory will appear in the discussions of the conditions for the possibility of reflexivity and positivisation.

Any reflexivity presupposes as its condition the distinction between the real and the temporally possible or the modalized. Thus, a particular social history does not vary only in terms of the presently given and selected facts, but also in terms of constitutive conditions of selectivity based on possibilities which are temporal. The insight into the selectivity of facts in any social process is a key to the constitution of the relationship between social facts, their structures and the temporal horizons or possibilities. Thus, the fundamental condition for possibility and for the selectivity of facts within a social process is temporality. This means that the condition for the possibility of a social system as a process is a modal generalization constituting the temporal horizons – in both temporal directions – of such a system. This assumes the above discussed dimensional time with its horizons of possibilities.

The consequence of such a modalized conception is that all selectivity and all delimitation of facts are based on a system's structure conditioning in its turn the horizon of possibilities out of which events are selected. This selectivity is a process of reflexivity in that it allows a distanciation from the present and its evaluation in terms of the various possibilities of the future. As a condition for the possibility of reflexivity, the temporal horizon offers a distanciation from the immersion into facticities and opens the various options in terms of which the present state of affairs could be evaluated. Yet, it must be stressed that the options are not absolutely arbitrary. The social system itself may be used to reflect upon the horizon of possibilities and indicate the limitation of such a horizon: here emerge the socially possible and the socially impossible.

It could be maintained that more complicated social systems require more extensive, abstract and more differentiated temporal horizons for reflexivity than the simpler systems. They reach a higher worldcomplexity, richer with options of norms and valuations, which in their stead constitute a basis for a more refined selectivity of living and acting. Such reflexivity, from a temporal horizon, enables the synchronization of innersocial histories of systems which are divergent (e.g., moral systems, ideological positions, pay scales) with systems of economic production, education and others. Yet, it must be said that complexity is a multidimensional quality of a system: thus, it is impossible to say, without any further qualifications, whether one system is more complex than another. Hence, a higher complexity of a system does not mean a higher complexity in temporal horizons – or in any relationship to the environment. More complex social systems do not necessarily have a more complex history, let alone in each respect a more complicated history. Researches concerning cognitive and volitional complexes of psychic systems have indicated that more complex (more abstractly structured) systems gain in capacity to have simpler or more complex environmental relationships. The structural abstractions open a set of complex and simple, differentiated and undifferentiated relationships to the surroundings and offer the possibility to specify the surroundings sectorially in terms of depth and differentiation and, if need be, to shift the specifications. Language is here misleading – more complex systems do not require higher complexity in everything.

This most limited discussion of the conditions of reflexivity has opened the possibility to consider further the shift of the concept of theory to a concept of critical theory as praxis. First of all, it must be noted that the current European thought theory has no longer a privileged status to be an extrasocial, extrahistorical or extratemporal process, surveying events indifferently from a nonparticipating observer's stance. Theory too functions in society and history and in its stead changes the very "objects" of its explanation. Hence, a critical theory must (i) show how its very explanations of events will influence such events, since such an explanation can be subsumed under reflexive process and its predictions either enhanced or thwarted; (ii) it must evaluate social events from a temporal horizon of possibilities, showing what is possible and what is impossible within a given social system and its subsystems. This means that a critical theory must correlate all factors and show how, in this

correlation, some possibilities are realizable, others probable, and still others made impossible. For example, it must show how an economic capacity may be thwarted by a political incapacity, a moral stance or an economic misapplication; or how an economic capacity, yielding certain options, may become impossible due to a technological incapacity. At the same time, the critical theory must show the limits of the possibilities of a social system and delimit what changes must be instituted within certain social sub-systems to surpass the limitations. Critical theory, thus, constitutes the most encompassing process of social reflexivity in history and, ultimately, in the complexity of world time.

The emergence of the reflexive social mechanisms has led to an increased achievement and progress in every social area, but at the same time it has opened a proportionate increase in risks. How can one have faith in justice if its norms are exposed to constant change and finally to decisions by political figures? One thing is certain: the reflexive mechanisms are unavoidable if the attained level of social complexity is to be maintained. Moreover, it is dubious whether the risks could be avoided by retrogression to some pre-reflective conception of order, such as natural law, historical reason, purposive progress or true values. The expectation that a measure of dynamism and motility, of change and time, would reside in something changeless becomes a disfunctional ideology. The question addressed to sociology is the following: what presuppositions and conditions must social systems or societies possess in order to institutionalize reflexive mechanisms? It is to be assumed that only social systems of high complexity of social processes can be transformed into reflexive mechanisms sufficiently trustworthy to orient other social processes. High complexity, in its own stead, allows functionally structural differentiations and such differentiations are conducive for reflexive decision-making processes. Thus, complexity and the resultant differentiations of functions constitute a condition for the institutionalization of reflexive mechanisms. Yet, this is insufficient, since the reflexive mechanisms must be employed for the orientation of the whole society and hence must be oriented by some political mechanism. Such mechanisms must, of course, be reflexive so that political decisions could be reflexively corrected or changed.

It may be correct to maintain that complexity and differentiation of functions through reflexive mechanisms is a guarantee of stability, but at the same time it may also be a guarantee of stifling bureaucratization of

all social segments, an entrenchment of positions which would resist any change. In fact, instead of promoting change, it would tend to differentiate itself into more "refined" functions and hence use the reflexive mechanisms to expand itself and not to constitute a benefit for society. Moreover, the institutionalisation of reflexive mechanisms capable of differentiating the temporal horizons into an indefinite set of possibilities may lead into an investigation of empty sets and not of concrete problems. To correct such wasted effort, other reflexive mechanisms would have to be established to decide on the reflexive mechanisms which are not accomplishing anything. It is like having congressional committees to investigate a particular problem and its possible solutions and then to form another committee to see whether the other committees are solving the problem and then to hire a consulting firm to check whether the last committee is adequately equipped to pass judgments on the previous committee: a song without end.

Institutionalized functions tend to maintain themselves and, in fact, to proliferate themselves indefinitely and hence, instead of becoming aids in social process, they become burdens and hindrances. This is perhaps the weak link separating political and bureaucratic spheres. With political changes, some bureaucratic functions may become redundant; in order to maintain themselves, such functions (or the functionaries within them) might accept subservience to political whims and thus break down the strict distinction between the two spheres. That there are problems in this approach does not detract from the explication of social processes and their modal logic.

Within the horizons of dimensional time, everything is possible, specifically given the modern atomistic ontology and quantitative metaphysics, but not everything is possible within the constraints of a specific social system. The latter narrows down what is important, allowable, valuable, what can and cannot be selected. At the same time, the social structure functions in the context of the dimensional time which retains open horizons of history and its significance for selectivity of future possibilities or even possibilities to reclaim the meaning of past events that were closed by the social system. This is the pivotal point for any society: what is possible or impossible, depending on the social structure, shows the limitations of that structure and, reflecting from future possibilities, illuminates the boundary of society and poses a problem for the established institutions. This means that the presence of possibilities,

excluded by a social structure, is also a temporal reflexive moment that provides a fundamental critique of a given society: the judgment is a reflexive awareness that assumes a going beyond of a given society and leading to challenges for fundamental transformations.

Moreover, within a social system, not all possibilities are equal, and the valuation which will take a priority and others will be postponed depends on an interrelationship of complex factors. While some social structure will exclude some possibilities as not permitted, the same society will adjudicate the significance of what must be done as soon as possible, and what must wait its chance to be realized. What may be possible socially may be remotely possible or even impossible economically, and what is possible economically may not be acceptable "morally" or technologically. It has already been pointed out that the proliferation of technical disciplines, each pretending to be independent of others, cannot be maintained. Each is involved with others, for example, physiology, biology and genetics are involved with chemistry, electronics, health values, farm production, nutrition, diets and public efforts to manage their connections and results. Our reflection upon ourselves and what we want is far surpassed by social technologies that escape the best experts understanding. Precisely speaking, social technology is intertwined in a complex web of social factors and cannot be regarded as an independent domain that can run its own praxis.

Time Reflex. It is now possible to sketch the role of time reflex. Since any activity of investigation of social, historical process relates the social structure to the dimensional time horizon, then such an activity is totally correlated to time reflex and, as noted, to the horizon of constant variations. This means that the changing, widening or narrowing of the temporal horizon during scientific research shifts the selectivity and significance of events. The reason that the social researcher is included depends on the fact that no social actor has any longer a privilege to view social history from outside as a non-participating observer. This means that the researcher equally selects social events from a past or future horizon and relates selected events as "significant" in their mutual – temporary – intersections and, in accordance with one prescript of science, offers prognoses for the future – but not a future of the whole society. It is also the case that the scientific prognoses will not be "innocent" but make an impact on changes of the current events. Given a new biological technology and the technology of harvesting a farm of certain size, it

will be predicted what the yield will be, leading to the changes in animal production, in market behavior (after all, one speaks about "buying and selling futures"), design and production of new agricultural machinery and even bio-chemical compounds to change the biological technology. The point is the following: social science is not an external role, but, by investigating certain social events, it changes them. This is not to negate such a science, but to point out its instrumental nature.

At the beginning of this essay, a claim was made that there is no encompassing social theory, and yet another claim was added that the limit of what is possible depends on a social structure. Does this not mean that the researcher, who discovers what is impossible, reaches an understanding of a society and in principle has an encompassing social theory? Two points are relevant for this question: first, reaching a limit of what is socially possible always involves one or two possibilities: in Europe and generally in the West slavery is impossible, but what is possible is a practical treatment of persons as dependent on a "master", such as a corporation, or totally dependent on the latest technology for education. Second, theory explains without changing the explained phenomena; contemporary research changes the phenomena that are to be explained, and hence, with changing social technologies, each new theory will become part of the changes and, in turn, will change the use and promotion of such technologies. In this sense, an abstract notion of "praxis" may count as a theory, since it has become global, but a theory that is part of the modern Western instrumental understanding, based on temporal horizons and their reflexivity. In brief, the modern interpretation of the world is "what works" and no other interpretation is even understandable.

"Time reflex", its dimensional composition, allows for selectivity of futures which may reflect upon the factors of the past and make them relevant for current events and what can be done with them. In turn, an investigation of past events may constitute an opening to what the future needs. Thus, the influence of the past on the present and future is not causal but significant. After all, some technical inventions in the remote past do not cause their present appropriation, but suggest their significance for some future projects that are equally significant. Hence, while moving toward the future horizon, our activities also select and establish orientations and inter-relationships of past present and future events. Since activities are correlated to time reflex, then the time reflex

is the ground for an understanding of temporal field, inter-relationships, comprising the historical dynamics of a society. The dynamics allow for the inter-play between "present of the past", "present of the present", and "present of the future". Each such present is given with its temporal horizons which intersect and are continuous with other presents. Shifts in the present correlation of events institutes shifts in the horizon of possibilities and correlatively initiates in the present of the past and future and sets limits to what is at present possible and impossible, or at least what is significant and what is not.

The temporal conditions for reflexivity are quite complex, although they can be managed by higher levels of reflexive inclusion. Modalized aspects can be again modalized under more inclusive possibilities and wider horizons. One can discuss the possibilities of reality and reality of possibilities or even possibility of possibilities, necessities contingencies and so on. The complexity of the temporal condition of reflexivity can be characterised in the following way. There can be a present future which must be distinguished from the future present even if only on the grounds that the present future contains more possibilities than is possible for future presents to become reality.

Having outlined the dimensional time as history with its fluctuating horizons as a way that modern societies function globally, the time reflex that has a direct relationship to technologies must now be indicated. Many researchers and producers of technological "progress" have claimed that history is irrelevant, regarding history as a linear succession of events where past is no longer and future is not yet. After all, if the past is no longer, and our social conditions have changed, then past has no bearing on our present. The same can be said of the future. It is not yet and thus it cannot be a factor in our present reality. There are no things at present that are from the future on a linear time. After all, future is not one of the observable events. But as was explicated so far, history understood on the basis of instrumental rationality is very different and must include both past and future at "present" and thus introduce history in the previously articulated sense. Now, since the future contains the unrealized possibilities which we plan at present which includes the past, then the present technological planning already assumes that it is the past of the future, and the future of the possibilities developed from the past. In addition, not all the technological possibilities of the past have been

realized at the present technological stage; thus, they may constitute the future horizon of the present technological stage.

The emergence of the reflexive social mechanisms led to an increased achievement and progress in every social area, but at the same time opened a proportionate increase in risks. How can one have faith in justice if its norms are exposed to constant change and finally to decisions by political figures? One thing is certain: the reflexive mechanisms are unavoidable if the attained level of social complexity is to be maintained. Moreover, it is dubious whether the risks could be avoided by retrogression to some pre-reflective conception of order, such as natural law or true values. The expectation that a measure of dynamism and motility, of change and time, would reside in something changeless becomes a disfunctional ideology. This was the case with the Soviet Union and its continuation in the form of Russian autocracy. This is not to say that ideology is to be discarded completely; rather, that a given modern society and its political structure should have various ideologies that comprise dialogical openness to manage diverse levels of social factors. Ideologies are fundamental reflexive mechanisms – the political parties that offer ideologies immediately can see the limitations of one ideology by reflecting from others. As reflexive mechanisms, they are relevant as criteria for orientation of the whole society and hence must include value decisions. Such mechanisms must, of course, be reflexive so that political decisions and their values could be reflexively challenged, corrected or changed.

If a political system is to be established on the basis of complex decision processes, then it must establish social mechanisms for the nurture and testing of political ideologies for the creation of consensus as well as the initiation, preparation and control of binding decisions. This introduces far reaching restructuration in politics and considerable changes in bureaucracy dealing with juridical norms, governing processes and value adjustments. Political support cannot be guaranteed by traditional institutions, since it is related to an extremely differentiated process of decision-making. It must be constantly readjusted and this readjustment must be institutionalised only temporarily. At the same time, the state bureaucracy, all state agencies must be specialised for the implementation of diverse programs. These two functions, the political and the bureaucratic, lead to a strict distinction between politics and bureaucratic agencies. Such separation must be strictly maintained in

states with more than one political party. It separates not only roles, but also purposes and behavioral expectations; at the same time, the criteria and rationality are distinct for each. Even states with a single political party no longer maintain a political hierarchy within state agencies but distinguish between party and state bureaucracy. Only in the developing nations such a distinction has not yet been fully developed. At the same time, this means that the reflexive mechanisms, for example, of justice and ideology, are also underdeveloped. Functional differentiations in society raise the complexity of decision process and this, in turn, requires reflexive, political processes. At the same time, such reflexive processes enable a stricter differentiation between various social segments, delimiting their autonomies and instituting their changes with respect to other social segments. In brief, the reflexive mechanisms strengthen the functional differentiations both of the various social segments and of the political system itself. Such differentiations and delimitations of functions act as stabilizing force since each segment assumes a relative autonomy and resists any arbitrary intrusions by political figures. At the same time, no political figure or even a group could manage the complexity of functions, strengthened through various institutionalised reflexive mechanisms.

This praxis theory – if it is at all a theory – comes closest to being adequate to the complexity at least of modern social life, yet using the very premises of critical theory that it itself establishes, it can be evaluated as to its problems.

Temporal Stability. If a political system is to be established on the basis of complex decision processes, then it must establish social mechanisms for the nurture and testing of political talent, for the creation of consensus as well as the initiation, preparation and control of binding decisions. This introduces far reaching restructuration in politics and considerable changes in bureaucracy dealing with juridical norms, governing processes and value adjustments. Political support cannot be guaranteed by traditional institutions, since it is related to an extremely differentiated process of decision-making. It must be constantly readjusted and this readjustment must be institutionalized only temporarily. At the same time, the state bureaucracy, all state agencies must be specialized for the implementation of diverse programs. These two functions, the political and the bureaucratic, lead to a strict distinction between politics and bureaucratic agencies. Such separation must be strictly maintained in

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While the horizons of history and their dynamics are outlined, a "vertical" axis that will provide a "temporal" stabilization of temporal reflexivities must now be articulated. As noted, the reflexive mechanisms, if they are to be positivised as accessible to scientific research, must include political ideologies as value criteria for positing and selection of what will be regarded as significant to adjudicate other levels of reflexive mechanisms: first level is the lowest common denominator: economy and the way it produces, distributes and manages wealth. Different ideologies emphasize different values, which most significant among them are freedom and equality. Conservative and the current neo-conservative ideologies promote the value of freedom in the economic sphere (even if economic freedom is logically an oxymoron), and thus will push the judicial system to promote laws limiting the interference of government and other social institutions into "private business". These ideologically evaluated laws comprise a reflexive mechanism for adjudicating the rules of taxation and distribution of public funds for social needs, such as health, education and welfare. But the distribution goes through another

reflexive mechanism – the banking system and its rules of lending and borrowing, reaching into all levels of concrete economic ventures, from building to car making, to wages. Meanwhile, the educational system will be promoted for the training in technical skills needed for business, at the expense of liberal disciplines and critical, political thinking. No doubt, the education system will comprise a reflexive mechanism that will evaluate what the "business world" needs and help steer the school programs toward the demands of the market. On the other hand, a liberal ideology will tend to value equality and direct the judicial system toward different rules of taxation and distribution of public wealth. Reflecting from this distribution will be changes in educational programs, public support for health, minimum wage laws, protection of the environment and, reflecting from the environmental issues, the changing in production technologies and even means of transportation.

The vertical axis is equally connected to the dimensional time, its horizons and their transformations. A temporal prevalence of one ideology will be reflected in the future possibilities, such that a different taxation will change investments in the future technical needs, in educational programs, such that a given project that can be realized in five years will have to be postponed for two years, pending the needed investment for achieving the goal based on new rules for technological innovation (e.g., bio-chemical) that must reflect from environmental concerns, leading to a horizontal reflection of time, in time, where each temporal possibility becomes reflected in the context of other possibilities. Moreover, the ideological values, reflecting vertically on other reflexive mechanisms, regarded as vertically stabilizing, such as moral systems, do intersect in future possibilities, even if economic, technical and scientific expertise are available. In principle, every technological innovation will have to take into account the vertical factors as reflexive mechanisms in order to proceed with projects, with a full understanding that the projects themselves will reflect back on the reflexive mechanisms present vertically and compel their evaluation. This is so obvious in today's global battles concerning the rules to manage the vast communication systems, developed by latest technologies. Reflecting from the horizon of their possibilities, do we change laws to protect "privacy" or do we change the very meaning of "privacy"? This is pure intersection of the vertical and the dimensional.

Postscript. By now, the major players of globalization no longer belong to one civilization; all of them must engage in the complex process outlined in this essay. While the national boundaries still function, the praxis, as prevailing social technology, with its dimensional time and time reflexes, positivised reflexive mechanisms, pay little attention to such boundaries. One prevailing theme is "stability" of global engagements and the technical management of their complexities. Thus, the West tolerates different political arrangements, including the nominal "communism" of China, as long as the dimensional time and history retain their open horizons and temporal management. Indeed, to enhance stability in this process, China is most interested in selecting some aspects of the past as an aspect of the future horizon – Confucian ideology next to "communism". When Russia returned to autocratic nationalism, it closed its horizons and accepted deprivations for its population, leaving a narrow militaristic "solution" for its aims. Europe itself is tensed between the values of freedom, equality and Near Eastern autocracy (the case of immigrants from Near East), demanding the tolerance of a closed past and future. How this will be resolved depends on the ways that technology will be able to manage the complexity of time reflexivity and its global simplification through higher levels of abstraction in systems of communication. The latter must balance privacy and technical intrusion into privacy and, as it was briefly mentioned, the task falls on the values of ideologies. In this sense, much more research is on the horizon to reflect from the future possibilities of what is to be done today.

1.4. Identity Influence on Problem Solving Performance in Networked Society

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In the 21st century, the processes of globalization, technologisation and regionalization have been raising new challenges both for politicians and researchers. The emerging new societal communication and relation forms and intensity claim to change essentially the social practices that have been considered natural so far. New possibilities which are, first and foremost, provided by technological advancements give birth to

new challenges and new threats which, if viewed from the traditional perspective, often remain unrecognized and not understood. The first decade of the 21st century, which brought economic, (geo-)political and social processes into a global whirl, as if confirms that global changes will remain the most salient features of the new millennium in the future, as well. Thus, what can be described as being certain and factual in the future is undoubtedly the uncertainty itself. This does not mean, however, that, having acknowledged that the forecasting of future political and social processes equals an elementary sweepstake guess, we have to stop projecting our actions. On the contrary, visionary approach and ability to act in a proactive rather than reactive way guarantee success in the dynamic and accelerating world order. The world societies seeking to maintain their avant-garde position will be less and less able to devote their time and energy to the solution of the problems pertaining to societal security and raising organizational efficiency. It will simply be too expensive. The future avant-garde society is the society that will be able to minimize the possibilities for problems to arise.

This chapter is focused on the discussion of some proactive technologies (in this monograph, such technologies are social technologies) that are capable of contributing to ensuring an optimal organization of society. The author maintains the position that the network structure (network society) is one of the most prospective future societal organization forms. In the future, due to the above mentioned processes of globalization, technologization and regionalization, the form and expression of the networked society should strengthen, firstly, in the EU integration context. Since the principles, which the functioning of a networking structure follows, impede (and even contradict) the effective functioning of the traditional hierarchical mechanism, the identity management of network's nodes (structural units) becomes one of the most prospective forms of control. In other words, a node being unable to interact with the center of a network (it does not exist) has to interact with the whole network. This kind of interaction is possible only through identity; therefore, it is important to re-consider both the meaning of identity and the relation between structure and unit by explaining international processes.

However, as regards methodology, such analysis faces serious problems. The competing positivist and post-positivist scientific perspectives offer different understanding of identity, expression of identity and interaction

between structure and unit. Neither of the viewpoints provides such analysis with appropriate tools; therefore, it is necessary to search for an intermediate way.

In this chapter, as regards the above presented problems, the author provides theoretical guidelines for the research which seeks to assess the impact of identity on more effective ways of organising a networking society. For that, the competence of social technologies is employed. In this article, the author looks for a possibility to align the logic of identity research and theory of social technologies. At the end of the paper, possible ways for understanding the impact of social technologies on identity control and optimization of the management of social societies are suggested.

Arguments over "ways of knowing". For the last two decades, representatives from various fields of social sciences have been stressing the occurring important changes. International experts of politics have been concerned with forming new world order, economists – with the rising centers of economic power and the lessening importance of a national state in regulating financial flows, and sociologists – with the societies" identities acquiring new implications and new meanings. Undoubtedly, all these transformations influence many spheres of individual and societal life: starting with the self-identification of an individual and society and ending with the management and administration of public and private resources.

Presumably, the national state and transformation of its former functions are in the center of all these events. This is a logical and easily "verifiable" premise: in the 20th century, a national state was, undoubtedly, the most influential form of societal organization. Thus, its weakening influence or transformation of its functions also strongly affects other social societal processes. The dynamics of societies" identities is one of the most important processes accompanying transformation of state functions. However, in the realm of social and, specifically, international relations sciences, the categories of "identity" and "identity transformation" have not been adequately assessed yet. Though the problem of "identity", "self-identification" and "formation of identities" is "naturally" prevalent in various kinds of research on international relations and geopolitics, the very category of "identity" has not been acquiring sufficient heuristic potential. In other words, "identity" is either perceived as something natural and given (and this, in turn, does not require deeper research into

"identity"), or "identity" is perceived as something objectively "intangible" and, therefore, any research into identity is limited, regarding scientific and especially political practice, due to the problem of "perception of identity" caused by relativism. Meanwhile, any attempts at establishing "the middle ground" aligning different ontological and epistemological positions are viewed with scepticism.

Such highlighting of the problem of identity's (non-)consideration can be found in harsh inter-paradigm discussions among social sciences theorists that have been fired by the questions: what is reality? Can we, and if yes, then how, know what it is? This confrontation between different paradigms of perceptions of processes occurring in the world and their accounts can be treated as collision between positivism and post-positivism (Waever, 1996).

The positivist paradigm in social sciences developed as a position claiming that social sciences have to follow the example of natural sciences. David Hume, Jean le Rond Alembert, August Comte, John Stuart Mill, Ernst Mach, Moritz Schlick, Rudolf Carnap, Hans Reichenbach and Alfred Ayer are the most influential theorists and formers of positivist philosophy and science. Their arguments influenced the formation of social sciences as a science that is "real" and resembles natural sciences through "establishing" the laws in social processes and unbiased and objective researcher. This, correspondingly, formed a specific social "architecture" of the world where commonalities and laws exist and where an individual or a social formation (state) can (and has to) be reduced to any other formation.

The post-positivist camp of researchers of international relations started reflecting on the grounds of cognition and understanding in social sciences, the researcher role and the implications of subjectivity and objectivity. Finally, some post-positivist theories came to the conclusion that the objective understanding of reality and a truth that can be proved empirically are impossible. That is to say, in social sciences, it is unachievable and impossible to expect the same conclusions (in the sense of reliability) as in natural sciences (Lapid, 1989).

An important innovation in the post-positivist wave, for instance, which was brought to the discipline of international relations by post-positivism, is the highlighting of the importance of identity, identity construction that is able to explain the dynamics of the changes occurring in national interests. This allowed challenging the idea of a rational nature of

man – homo economicus – and to assess scientifically the presumption that the interests of individuals and states are not "given" but rather constructed and, therefore, changing. The criticism of positivism has also emerged on the epistemological grounds, firstly, by claiming that an objective truth does not exist, norms cannot be analyzed in a positivist manner, they must be understood as inter-subjective constructions (Kratochwill and Ruggie, 1986); this is why, as regards methodology, it is impossible to come up with one scientific method. The plurality of methods and interpretation of social processes is necessary.

Thus, in all this argument, a borderline between two camps appears: following A. Wendt's majority, who think that science is an epistemic privileged discourse that enables us to gradually acquire a more correct understanding of the world, and minority, who object to the privileged epistemic status of science in explaining the world (Wendt, 2005). More often than not, not only deep, but also wide, abyss opens up between these two positions that limit the possibility of intermediate positions of theoretical explanations. Correspondingly, the strict binary position and the belief that a "consensus" or some ontological and epistemological combination of these differing positions is impossible radicalize the viewpoints of both sides.

In the post-positivist camp, for example, postmodernism generally treats science as a "conceptual system" which destroys other forms of life and cognition by creating (not explaining) reality. Alongside that, postmodernists, by claiming that all things are constructions of human mind and imagination, deny any objective forms, natural instincts and the nature of man or society. In other words, science is not a tool of truth or tool for finding truth, but rather a forced repressive system of power. Thus, we naturally approach the viewpoint that everything is a "text", that the main substance of texts, societies and almost everything else is meaning, that meanings have to be decoded or "deconstructed", that attempts at generalizations are impossible or at least should be unacceptable for science. Thus, consequently, the very "theory" turns into pessimistic misty reasoning about *the Other* and the impenetrability of his meanings when, as E. Gellner puts it, the only solution available to a good scientist is silence if he wants to be objective (Gellner, 1993).

On the other hand, the pure positivism unduly degrades and simplifies social sciences because of its position that society can be researched by the methods of natural sciences, that there is a clear and unchanging distinction

between object and subject, that society or such social formations as state are as if created by *God* and do not change. Such being the case, a research based on a theory becomes an intention to once again confirm the very theory but not an aim to explain and understand the processes that are analyzed.

Therefore, a strict distinction between positivist and post-positivist positions and practices and between causal and constitutive explanations of social processes leads straight to a dead-end, where K. Booth's (1994) requirement for making practice the aim of science and theory can unexpectedly get lost or distorted. In other words, the decision of a scientist or researcher to combine consistently epistemological and ontological positions (either positivist ontology and epistemology or post-positivist ontology and epistemology) can be achieved by sacrificing pragmatism and impeding the progress of analysis[1].

In search of the middle grounds. The way out from this "theoretical confusion" is suggested by the premises of scientific realism. In international relations theory, probably the most successful application of the premises of scientific realism is found in works of "the middle ground" constructivists. These constructivists combine the positivist and post-positivist positions that many consider to be irreconcilable: they adhere to subjectivist ontology but deny the necessity for it to imply positivist epistemology. "The middle ground" constructivists allow for certain exceptions in the ontological and epistemological positions, i.e., these positions do not have to comply fully with the pure and strict framework of one (either positivist or post-positivist) position. Alongside that, the premises of scientific realism enable "disengagement" from a concrete theoretical constant (this is not characteristic of, for instance, neorealism in international relations studies) and, when needed, to replace it with a better one.

Though scientific realism aids in showing that societal science can explain social phenomena, realists also agree that theory constructs its own (subjective) facts to a certain degree. Therefore, it means that realism is partly anti-fundamentalist. In other words, even when we are guided

[1] Sacrificing pragmatism and impeding the progress of analysis can be understood as a situation when strict theoretical boundaries block the way to using the newest methods and technologies in carrying out analysis or solving societal problems. For example, a researcher who consistently follows positivist ontology and epistemology will perceive identity as a "fixed", almost unchanging factor and, thus, (most probably) the solution to social, political problems will not take into account the attempt to solve specific problems by affecting ((re)constructing) the societal elements pertaining to identity.

by formulated "mature" theoretical instructions to account for some facts, we have to have a clear understanding that we are dealing with only "approximate" truth. However, this does not necessarily pre-suppose that this "approximate" truth cannot be objective. Following realist principles, as A. Wendt maintains, we can talk about an objective reality even when we wrongly perceive its nature (Wendt, 2005). Since due to science we gradually acquire a better understanding of the world (even considering the fact that we cannot claim to know absolute truth), the reality at a fixed temporal and spatial point can be and has to be perceived as objective. This insight, as it will be shown later, is important in carrying out research into identity.

Therefore, in this context, "the middle ground" should not raise longer discussions about, for example, inconsistency or, generally speaking, "anti-logic" in theory combining positivist and post-positivist assumptions. On the contrary, in some cases, "the middle ground" is even more advantageous both in K. Popper's and T. Kuhn's views. As regards some of the positivists, "the middle ground" (because of the logic of realism) is superior since it does not claim to possess absolute knowing and does not reject the inter-subjective origin of the social world. Meanwhile, regarding some post-positivists (especially the wing of radical relativism), "the middle ground" is superior since it provides us with a much clearer (in the sense of explicitness) theory that does not surrender to the unyielding relativism and inter-subjectivity. Thus, integration of realist ideas creates immunity to the relative relativism which, by claiming that everything is relative, is unable to prove that the very statement that everything is relative is not relative (Kukla, 2000).

Another requirement, in order to maintain the explicitness and falsifiability of a theory, is the necessity to align knowledge with "nature". This imposes the acknowledgement that there are phenomena in the social world that cause certain consequences independently of our preferences. In other words, without "nature" and causal "definiteness", theories following constructivist (post-positivist) ontology go so far that it becomes impossible to falsify them. In addition, not having certain boundaries to the reality (we do not have them if we completely ignore the impact of the material essence), we significantly reduce possibilities to suggest valuable insights for, e.g., political practice (and this, in particular, should be the major function of a theory). This is why social theory should seek as explicit correspondence to the base of the material world as

possible. However, as it has been already mentioned above, a researcher's set of theoretical instruments cannot be determined by only causal or only constitutive restraints. It is necessary to search for their mutual consistency that encourages adopting a pragmatic viewpoint in explanation of social phenomena as a methodological criterion for using everything that aids us in understanding of how the world functions (Wendt, 2000).

Therefore, in the light of the realist ideas, the aligning of theoretical "explicitness" (which is not characteristic of the pure post-positivism) and acknowledgement of constitutive processes as essential phenomena for social structures (what is not characteristic of the pure positivism) could be regarded as progressive solutions seeking to provide not the correct (what is characteristic of the pure positivist theories and in some cases post-positive) but the best of the existing "formulae" accounting for the occurring international processes. Simultaneously, it renders this theoretical approach more falsifiable than, for example, some reflectivity theories which are often merely critical or intriguing. This is particularly important if we adopt the assumption that a scientific theory has to be consistent, explicit and aimed at practice.

Ontological and epistemological insights for the research into identities management. The formulated theoretical guidelines allow for further more detailed definitions of identity, identity change and the importance of the identity change management mechanisms as well as possibilities to conduct theoretical and practical identities research. In order to assess the impact of identity on more effective solutions to society management problems, in this paper, the author will specifically focus on the national state as the most important and effective mechanism of society management. Since the national state and the interests of national states and their multilateral mutual interaction are the most important objectives of the research into international relations, the author will further follow the paradigms of this science and will attempt to supplement them with insights pertaining to social technologies (as a technique for analysis and research).

In the above-discussed perspective of "the middle ground", the international system is seen as an international social system formed by socialization processes. Thus, the narrow and strict positivist belief that states are inherently aggressive and opportunistic (according to Morgenthau (Morgenthau, 2011)) and that the international system is always an inborn anarchy (according to K. Waltz (Waltz, 1979)) is rejected.

There is no single nature of states; therefore, there are no preliminary national interests that are "inherently natural". The international systems, the "nature" of states and national interests – all change alongside changes in social environment. The behaviour of states and the content of cultural forms cannot be explained only by "pre-social" facts as, for instance, is done in T. Hobbes's and A. Smiths" treatment of the human nature.

However, such rejection of materialist ontology in defining the international system is partial. The previously formulated statements allow supplementing constitutive principles with materialist logic. Thus, the international socially constructed system and behaviour of states partially depend on the "biological drives" such as survival, recognition and power seeking. Without considering such drives, it would be difficult to provide any explanations of a social action. Nature influences the behaviour and interests of human beings and states; however, finally, their interests depend on their ideas, not their "genes" (Wendt, 2005). In other words, the real world is made of both the material and idea-related components; therefore, for instance, states (or other system participants) will always seek influence and power in the international system but they will differently perceive that influence and power and will seek for them through different forms. For example, the Treaty of Westphalia, which was signed in 1648 and which established the power balance in Europe, saw the traditional warfare as a major state strategy for strengthening its power and the economic security of a country was directly related with territorial expansion; meanwhile, in the 20th century, a "commercial" state arises which relates strengthening of power more and more with absorption and control of economic, cultural, social and informational space.

The category of identity occupies an important position in this logic; this category, in "the middle ground" theory, is in some sense "material" and, thus, contrary to the theories of critical constructivism, it can be observed and researched empirically. In other words, due to the relatively slowly changing "reality", a concrete identity can be "fixed" and this creates conditions to formulate and check scientifically substantiated hypotheses. As it will be shown later, this theoretical possibility of "fixing" identity is important for enriching the social sciences research with insights from theories of social technologies.

Changes in states" identity are determined by cross-border social processes when cross-border interaction forms are being created, changed

and established. This is perfectly illustrated by A. Wendt, who claims that anarchy among states is what states do from it. So, depending on states, anarchy can be "Hobbes-like" war of all against all, it can be competitive (Locke's), it can be "Kant-like" when the distinction between *Me* and the *Other* becomes totally senseless.

For example, in the "Hobbes-like" anarchy, which is based on the conviction that national states are selfish formations only seeking advantage for themselves, the sovereignty of state (as one of the major components of state identity) will be essential, undivided value and its loss will be directly related with the threat to national security. Meanwhile, in the "Kant-like" anarchy, the unconditional safeguarding of national sovereignty acquires a different meaning. Renouncing some part of national sovereignty and acting for the benefit of a particular international community can be regarded as national interest. Thus, these theoretical assumptions can show how perception of sovereignty (one of the most important elements of national identity) in certain countries determines their strategic behavior and national interest.

The problem of structure and unit. The interaction between structure (an international system) and structural unit (state) is not simple. This is obvious in structures of networked nature where there is no one clear center of power and authority. The network structure (it will be discussed in more detail in the other part of the article) is a decentralised structure, the power center of which can be understood as the very self-regulatory regime of the network "ordering" and "determining" which identities of the network's nodes suit and which contradict the structure. In this sense, the identities of the nodes (units) of a networked structure are political and active regulatory components of the networked structure.

The networked structure and structural unit (node) are related by a mutual relation[2]. The structure is what the structural units make of it but also the structure affects (limits, enables) the structural units. So, there is no advanced "natural" structural unit (H. Morgenthau) and no advanced "natural" structure. It is exactly due to this reason that the social space is at the same time dynamic (socially constructed) and, to a certain degree (at a certain temporal point), constant. The structure is what the

[2] Such relation between the structure and structural unit is not necessarily characteristic only of the networked structures. In this article, the author maintains the position that the described mutual relation is most intensive namely in the networked structures.

structural units "have agreed upon", so the influence of the structure upon the unit and the unit's influence upon the structure will depend on specific interactional relations. For instance, whether "self-will" of structural units and breaking rules set by the structure is tolerated and how much tolerated, what mechanisms structural units can employ for defending common structural values. In other words, the strength of the relation between the structure and structural unit and their dependence will depend on both subjective (what the structure means for the structural unit) and objective (for instance, structure management mechanisms) factors. Namely, in this conjunction of the structure and structural unit, "identity" can be understood not only as the result of the relation between the structure and structural unit, but also as a means maintaining or even facilitating this interaction.

Thus, the identity-driven discrepancy between the structure and structural unit can cause tension between the structure and structural unit, and this can have various consequences: 1) a structural unit, owing to its relative or structural power or ability to rally other system agents, can destroy or considerably change the structure; 2) a structural unit, not possessing any of the mentioned powers or possibilities, converges when "pressed" by structure and obeys the structural logic. In the latter perspective, other system units also perform an obligatory and controlling function. They attempt to maintain the existing structural logic with the help of various pressure means (isolation, shaming, political and economic pressure).

This, correspondingly, leads not only to the conclusion that different qualities of the structure will impose different cross-border practices, but also that the subjects following different practices will get different acknowledgement in structures of different types (logics). In other words, a "collectivist" unit will not be successful in an individualistic structure maintaining the behaviour principles of self-sufficiency and autonomy of units. The same is awaiting an "individualist" in a collectivist structure. So, in this sense, a unit's identity can be directly related with the potential of strengthening the state's power and competitiveness in the system. In this regard, identity, though an "invisible" cultural phenomenon, still produces clear, tangible and visible reasons regarded as an objective factor that affects the state's power and influence in the structure[3].

[3] For instance, identification with the EU community does not allow regarding the EU as a process causing an existential threat.

The function of identity in the networked society. Following the end of the Second World War, intensive cross-border integration processes were started in the realm of international politics. The reconciliation between Germany and France gave impetus and inertia to the European integration. Though seen from historical perspective, the attempt to unite Europe was not a phenomenal historical event; the extent of the integration achieved by the states of the old continent does not have any analogous counterparts in the Western civilization.

The deepening integration processes have caused minor revolutions not only in organizing the interior and exterior politics of national states, but also in attempts to explain or forecast the further political, economic and social phenomena pertaining to the European societies. The greatest challenge was faced by the researchers who analysed the cross-border interactions of integrated and integrating spaces. How can we assess the impact of the supra-national EU institutions on states" politics? How is states" behaviour influenced by the strengthening mutual interdependence of member states? What is the importance of the EU identity, which is undergoing formation, in defining and implementing national interests? All these questions led not only to the recognition that the European society is acquiring new forms, but also to the search for the research models that are able to understand and account for the dynamics of the occurring processes. One of the attempts is the employment of such models as "network society", "networking", "network nodes" (e.g., M. Castells, (Castells, 2005), S. Borgatti, P.B. Foster (Borgatti and Foster, 2003)) to explain the principles of change of the national state and the societies of the national state.

The networked society, as M. Castells (2005) maintains, is the society of mutually related and inter-dependent units. As P. Hirst and G. Thompson put it, national states are no longer sovereign formations in the networked society; rather, they are component parts of one formation, "international state", where the enforcement of the legitimacy of supra-national management tools becomes their major function (Hirst and Thompson, 1992).

Having turned into the networked society and having lost their sovereignty, states lose the possibility to act only on their own discretion and be guided by narrow national interests. If that does not happen, we face the risk of losing the effectiveness of the networked society and its overall survival. Therefore, internalization of network norms, culture

and values regarding the network subjects is an important guarantee of the networked society's stability. U. Beck also agrees with that and claims that the condition for cosmopolitan systems (thus, for an effectively functioning networked society as well) is the (self-)formation of supra-national culture (Beck, 2002).

Currently, the discussed processes are most clearly reflected in the EU integration processes. J. Habermas sees the EU as a new world order model, and M. Castells treats the EU as one of the most developed networked societies. Therefore, it is not surprising that the researchers analyzing the EU integration, who have taken into consideration the EU members" mutual inter-dependence, economic, political and social (in public administration as well as in the spheres of private and public resources management) homogenization, have noted the EU subjectivisation tendencies.

For example, W. Wessels has formulated the "institutional fusion" thesis that stresses the EU integration's impact upon the states" administrative structures acquiring uniformity and their conformity with the norms protected by the EU (in other words, Europeanisation) (Wessels, 1996). This is noted by many authors investigating administrative systems. The widening openness of national bureaucratic structures and the communication among the EU member states" institutions (participation in the EU-level working groups, forums, multi-institutional correspondence, etc.) and the encouragement of these processes perform the role of socialisation and creation in the EU communities (Checkel, 2001); it also leads to re-consideration of the national state's place and role in organising and administering various spheres of societal life.

This is why analysis of the formation of the EU identity and its specificity occupies an important place in the studies of the EU integration processes. The EU identity can be perceived and seen as a platform to mobilise society, to enable different national states to guide themselves by common (European) interest. Thus, the European identity can be also regarded as a form of social (and, therefore, managerial) culture, social intelligence, which determines both internal and external (cross-border) EU member states" social actions, the form of decision implementation and expressed intentions.

This is firstly determined by the triple function of identity: 1) to enable an individual to understand who he is, 2) to show others who an individual is, 3) to show an individual who others are (Berger

and Luckmann, 1999). Thus, the EU identity should determine the EU member states societies" similarities in needs, interests and reactions to arising threats. Therefore, it is not coincidental that the EU cultural affinity and the need for the EU identity were highlighted when creating the EU communities. Already in 1951, Robert Schuman stressed that "before becoming a military alliance or economic community, Europe must become a cultural community" (Waever and Kelstrup, 1993). The formation of such community, potentially, would enable us to optimise and use more efficiently the resources of the European societies, to solve economic, political, social, managerial problems more effectively.

So, it is natural that in order to accelerate the EU integration processes and, in that way, to form a strong and globally competitive Europe, the initiative of the EU identity formation is strongly felt in the EU institution. The EU institutions create meanings, rules, norms common to the member states, all of which finally consolidate in the participating units (Adler, 1997), and thus become the impetus for the construction of the EU identity.

Such construction of identity can be understood as a "top-bottom" process when supra-national institutions "impose", "ingrain" artificial identity constructions on a multi-national, atomised (though institutionally defined) society. However, it does not mean that this process is exceptionally one-directional. Presumably, the earlier discussed bi-directional example of the interaction between the structure and structural unit perfectly illustrates the case of the EU integration: the states created, have maintained and are still creating the EU structure (rules, norms, institutions, legislation) that are again later controlled and transformed. State's chances of establishing itself in the structure will depend on how the state will perceive itself (who I am) and position itself (present to others who I am). This condition is characteristic of the networked societies, not societies of vertical hierarchy. In the networked society, without one clear center of power and authority, the units of the networked structure, seeking to get as much use as possible from the networked structure, have to interact with the entire networked structure, and not with the main, forming network node (which does not exist).

In that way and in this context, "collective identity" becomes a guarantee of the stability and self-discipline of the network and network units (nodes). So, in this sense, "identity" can be regarded not only

philosophically, just as "what I am", but also managerially, i.e., "who I am supposed to be", in order to optimise a specific activity. In other words, identity acquires an active function, not passive expression, in a networked society. The methods of social technologies are some of the most original and progressive ways to broaden the identity, EU integration and EU supra-nationalisation research field.

Social technologies as an intervention means. The problem of identity as a function in a networked society demands a separate analysis. In this part, within the frame of the presented theoretical insights, the possibilities for applying social technologies as a methodological and technical means in identity research are further investigated.

Social technologies are understood as a method for the application of information, communication and other new technologies in optimising the functioning of social systems. A. Skaržauskienė and A. Žalėnienė (2013) suggest that social technologies be understood as a set of "[...] chosen effective solution means that can be used more than once to solve social tasks and that can aid in achieving the envisioned results and socially impacting the behaviour of a person, social groups and various social formations". Therefore, social technologies can be regarded as any innovative tools, the application of which enables to create the pre-planned and desirable changes in social processes in order to optimise the structure of a social system, to lower the costs of management methods, to change the previous quality of an object at which social technologies are directed.

In short, social technologies should not be treated as merely digital or mechanical technologies (the hard technologies). Social technology in its broad sense can be seen as a strategy to manage the "chaotic", fluid social environment through technological innovations. Social technologies should be perceived as tools to unify the wealth of interests and intentions of the units of a social structure in order to use the internal features of a social community as efficiently as possible. Thus, social technologies can be seen as an intervention means to affect the social elements of societal structures. A clear declaration of the aim, the achievement of which can be facilitated by such intervention, is the major criterion enabling to call the technology which in one way or another affects social processes a social technology.

It can be noted that the structural changes in the world order that are created and intensified by the processes of globalisation and regionalisation are an important precondition for applying social technologies as an

intervention means. However, the need for the control of the elements of social structures is determined not so much by the existing specificity of world societies as by the dynamics of transformations of societal structures (which, in fact, reveals itself only in networked societies). In other words, only in the 21st century, when structural changes in societies of the world become more intensive, the need for application of social technologies grows. Technological advancements broaden the possibilities for "technologizing" the management and organisation of complex societal structures rejecting the hierarchical model. Social networks, means of public debates, social publicizing, virus marketing, social marketing, systems of artificial intelligence, virtual worlds (e.g., *Second Life*), legislation informatics and other technologies which are capable of forming a virtual community and collective intelligence can be used as a political and administrative technique, a technique which can become an important part in optimizing the management of a multicultural networked society.

Bearing in mind the aim of this monograph, social technologies can be employed for the aim of identity "management". Of course, identity "management" should be understood rather as an indirect acting of authorities in order to rally and keep together multi-culturally-structured societies, which are oriented towards wanted (shared) problems, to ensure active participation of these societies in solving structural questions, to accelerate consensus and to regulate and structure inter-societal discussions, to create and implement political programmes, in other words, to make use of all the mechanisms which can affect the convergence of the non-organised structural units from the perspective of the logic of the networked structure.

Also, social technologies can be effectively employed for carrying out elementary "diagnostics" of a structural unit's identity and "trouble-shooting" the identity-related problems of structural units. This option should be perceived as elementary monitoring of the intentions, positions, expectations, and opinions of structural units, as M. Foucault (Foucault, 1979) claims, to carry out (with the help of interactive technologies) a permanent survey and "examination" of societies. This would create conditions for constant measuring of structural units" divergence from the sought form and thus to affect the social structure, i.e., to gradually approach it.

Finally, the social technologies, available through the above mentioned way, can be used by a networked society as proactive (acting, not

reacting) means ensuring communicational, cybernetic security. Social technologies can be implemented in these sectors as exceptionally effective preventive tools providing means to neutralize threats even before they emerge. It is especially important for the margins of networked structures which overlap or are affected by the other, often competing or even hostile structures through specific channels of influence.

Thus, the application of social technologies to control, to discipline identity is an effective measure to control the multitude of identities in networked societies. Presumably, due to the networked society's specificity of impeding optimal use of the levers of traditional power, social technologies should be regarded as some of the most important tools for organising network power and networked society, which guarantee a fluent and progressive structural growth.

Conclusions. This discussion, due to the reality of social sciences and accounts of knowledge about it, leads to confirming the thesis that refusal to combine positivist and post-positivist ontological and epistemological positions can lead to a deadlock where the initial aim of a scientific theory – the practical use – would remain unrealized. To avoid this situation, it is worthwhile to employ the claims of scientific realism, which supposedly direct us to the third way ("the middle ground") that is capable of combining the mutually opposing perspectives of knowing and explanation. As the performed analysis has shown, "the middle ground" is theoretically and methodologically valuable, especially in analysing the interaction between the structure and structural unit in network-type societies.

When analyzing the interaction between the structure and structural unit (especially in network-type structures), it is necessary to be guided by the principle of interactive mutuality: the structure is what the structure units make of it, but also the structure affects (limits, enables) the structural units. Therefore, the expression of possibilities of a structural unit will directly depend on the structural unit's ability to be guided by and to use the rules and norms established in the structure. The mismatch between the intentions of the structure and structural unit will most probably evoke (re) corrections of either the structure (if the unit is strong), or the unit (if the structure is stronger). Thus, presumably, different structural qualities will impose different practices occurring among structural units (in this article, cross-border practices) and the subjects maintaining different practices will be differently successful in structures of different types (logics).

In network-type societies, specific feature of which is the impossibility of defining one clear power center in them, the need for understanding structural characteristics is especially important. Since a structural unit "cannot" interact with the structural "center" (it does not exist) in network-type structures, it has to interact with the whole entirety of the networked structure (rules, norms). Particularly due to this reason, "collective identity" becomes a guarantee of the stability and self-discipline of the network and network units (nodes). So, in this sense, a unit's identity can be directly related to the potential of strengthening the state's power and competitiveness in the system. In this sense, identity acquires an active (managerial – how I am supposed to behave) function, not a passive (philosophical – what I am) expression in a networked society. Since identity is not only an inter-subjective, but also a (re)constructed phenomenon, the possibilities of correcting, controlling a form of societal identity should be treated as proactive (preventive) strategies adopted by authorities in order to solve societal problems and problems related to the management of a society.

Social technologies can be seen as an intervention means to affect the social elements of societal structures. The application of social technologies to control, to discipline identity is an effective measure to control the multitude of identities in networked societies. Because of the networked society's specificity, which impedes the use of the levers of traditional power, social technologies should be regarded as some of the most important tools for organizing network power and networked society, which guarantee a fluent and progressive structural growth, societal socialization and preventive protection. To achieve this aim, both the hard and soft social technologies can be employed, which are capable of acting, controlling, classifying, diagnosing and, thus, directing the multitudes of social identities towards a preferred direction.

1.5. Traditions and Management Perspectives of Community and Non-governmental Non-profit Organisations in Lithuania

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Activity of community and non-profit non-governmental organisations (NGOs) in Western countries is associated with the spread of

citizenship and democracy and the ability to deal with social and other challenges in local environment, relying on local citizens" initiatives. Yet, in special cases, local governance authorities can be attracted. Since Lithuania regained its independence, new NGOs and communities have been established. However, public authorities claim that the situation in relation to democracy or involvement of these organisations into social networks or other problem solving processes has changed very little. One of the reasons why transfer of public services to NGOs has not been implemented in Lithuania is distrust in the (third) sector managerial competences.

Local communities and non-governmental organisations differ from other private and public sectors by their peculiarities. This (third) sector is characterized by its civic activities (political-civic and charitable-civic), based on volunteering and enhancement of social links. Peculiarities of non-profit non-governmental sector determine specificity of management methods and opportunities to apply prevailing good management practice in other sectors.

Indeed, managerial skills of Lithuanian community and non-governmental organisations have been scarcely researched. Worth mentioning are Aleksandravičius and Žukovskis (2011), Ališauskas, Jankauskienė and Kairytė (2008), Bagdonienė, Daunorienė and Simanavičienė (2011), Čepienė (2011), Grigas (2010), Guogis, Gudelis and Stasiukynas (2006), Jakutytė (2012), Juozaitis and Vilimienė (2000), Nefas (2007, 2011), Žuromskaitė (2014) and other authors, who attempted to identify one or another management or functionality aspect within the NGO or community in Lithuania. However, there is a lack of detailed analysis of the third sector development in Lithuania from the management perspective.

This work pursues to research community and non-governmental non-profit organisations from the management viewpoint in trying to bridge the research gaps of the area. Therefore, the aim of this study is to overview activity traditions and management perspectives of community and non-governmental non-profit organisations in Lithuania. In order to collect information for the case study, activity reports, regulations, management bodies, meeting minutes of organisations were analysed along with the empirical research, conducted by surveying representatives of organisation management bodies. Selection of the organisations was carried out according to their positive image in the society (their heads were treated as experts, for example, took part in TV and radio shows, invited

to participate in formal working groups by public authority institutions, as well as their organisations hold a reputation as reliable implementers of large scale projects). The organisations selected for the research were the following ones: Vilnius Balsiai Community (established in 2002) (CNO1), Lithuanian Foundation of Temperance (established in 1992) (CNO2) and Youth organisation Lithuanian Christian Youth Temperance Union (LCYTU) "Žingsnis" (Step) (established in 1997) (CNO3).

1.5.1. Community-based and Non-governmental Non-profit Organisations and Their Management Assumptions

This chapter examines community-based non-governmental, non-profit organisations activities, assumptions and goals and analyses key aspects of management, which will allow conducting an empirical investigation.

The breadth of the definition of community implies various approaches to community life and its evolution or development. Block (2008) provides the concept of community as a general term used to define people who are related to each other not only by sharing neighbourhood, having something in common, but also as people, united by their common experience. In other words, members of the community are people united by their free choice for a common goal. Blackshaw's (2010) understanding of the community today is a place where a person develops his personality, and each person, although being unique, nevertheless, is linked to others by invisible feeling of community. Meanwhile, Etzioni (2011) distinguishes the importance of emotional connection. He notes that:

- Community members are connected to each other emotionally;
- Community members are united not only by their common interests, but also by similar values;
- Members of the community tend to sacrifice for each other and community welfare.

The author presents community features that correspond to McMillans and Chaviso (1986) theory of the key elements composing the community value.

The main objectives of Lithuanian local community activities are to encourage the population to improve conditions of their living environment, motivate them for self-development and cultural expression, enhance solidarity and community manifestations, seek to prevent the

spread of social exclusion. Social development of a community may be the first step in the economic growth of the population, which is particularly relevant in order to create the right conditions for the sustainable development of rural areas (Aleksandravičius and Žukovskis, 2011).

The attitude of the Lithuanian public authorities is stated in the Law on Local Self-Government of the LR[4], which presents the conception of municipal community. Municipal community is understood as permanent residents of a municipality, who are related to the municipal council and other general public needs, interests and local legal relationship with other municipal entities performing public office. This concept includes people, public institutions and emerging relationships seeking needs satisfaction and problem solution.

From the management research viewpoint, the analysed community acquires features of organisation, which allow assessing community activities, analysis of the results, affecting the viability of other social phenomena.

Nefas (2007) suggests viewing community through the functionality dimension, when common territory and interests supplement common action criteria related to performance of social functions. According to Nefas, a functioning local community is a group of people, who live in a defined territory and perform certain activities for the sake of that area and thus, common interests and inner feelings of belonging to the same group of people arise (Nefas, 2007). The researcher calls attention to the fact that the definition of a functioning community is identified with understanding of civic community (Nefas, 2011).

From the management point of view, the term of community organisation would be more appropriate, defined by the Law on Local Self-Government of the Republic of Lithuania[5] and states that "community-based organisation is an association, whose founders are members of the local community (its part or several residential areas) population (or their representatives) and the purpose of which is to implement public interests related to living in the neighbourhood through initiatives". It should be noted that the definition of the term makes it possible to examine the activities of members of the community through the prism of organisational management and facilitate its analysis in the context of management of non-governmental organisations.

[4] Law on Local Self-Government of LR. *Official Gazette*. 1994, No. 55-1049.
[5] Law on Local Self-Government LR. *Official Gazette*. 1994, No. 55-1049.

More detailed discussion about the context of non-governmental organisations leads to the idea that due to a high diversity of non-governmental non-profit organisations, it is difficult to formulate general and suitable functions for all NGOs. Lewis (2000) refers to a variety of roles of non-governmental non-profit organisations: (i) operators, providing public services, which are often initiated and supported by the public sector organisations; (ii) catalysts that initiate activities and projects locally and also in order to influence public policy; (iii) partners, who develop relationships and partnerships without losing autonomy. Ilgius (1999) argues that the main NGO functions are the following ones: provision of services, representation of interests, mutual aid or self-help, resources and coordination. Fung (2003) distinguishes such functions as protection and representation of interests; socialisation of citizens; resistance and power control. Mačiukaitė-Žvinienė and Grigaliūnaitė (2006) also emphasize representation of different interest groups. Banks and Hulme (2012) identified NGOs as organisations providing services to the public and taking care of its needs, which often aim to and are able to influence the society. Jakutytė (2012), by summarizing various authors" views, argues that non-profit organisations perform an advisory function as well as the functions of involvement of citizens into implementation of common goals and the function of intermediary between the government and citizens. Generally, the literature discussing the issues of the non-governmental sector often focuses on activities of NGOs, related to the representation of interests, especially of disadvantaged groups and provision of services or assistance, which neither the state nor private sectors provide to those groups.

Describing the essence and uniqueness of NGO compared to other organisations, the following features of non-governmental non-profit organisations should be emphasized:

1) Institutionalisation – NGO has to act as a legally established organisation;

2) Independence – this organisation is independent of the state;

3) Non-profit – this is the main essence of NGO: non-governmental organisations can make a profit from their activities, but the profit cannot be distributed among its shareholders or members;

4) Self-governing – NGO manages its own processes, but it is not controlled from the outside, i.e., each NGO independently sets its own internal procedures;

5) Voluntarism – no one can force to join the organisation or force to secede from it (Salamon et al., 1999).

Ball and Dunn (1995) note that in addition to the above-mentioned basic characteristics of NGOs (voluntarism, independence (privacy), non-profit making), it is very important to serve the public interest (through generating public benefits, but not limited to narrow personal ambitions of members of the organisation).

Rather often associations or other organisations are established, not directly related to the pursuit of profit or implementation of public authority functions, more focused on the activities that respond to narrower interests. Such organisations sometimes use the English names, such as GONGOs, QUANGOs, BONGOs, PONGOs, FONGOs (Tragårdh et al., 2013):

- GONGOs (Government Organised) or QUANGOs (Quasi Autonomous Non-Governmental Organisations) – organisations that may describe themselves as non-profit. However, they are set up by the state or municipal authority's order and partly or fully controlled by them.
- BONGOs (Business-Organised) – NGOs established by individuals and represent particular individuals" (e.g., Business Confederation) interests rather than the public ones.
- PONGOs (Political NGOs) – NGOs, established by certain parties, trade unions, which have a similar purpose.
- FONGOs (Funder-Organised) – NGOs supported by some sponsors, through getting some funding lose their independence and seek certain benefit.

In Lithuania, in order to distinguish between the different organisational units, which would serve the public interest and be focused on creation of public benefit, the legislature validated the definition of NGO in the Law on the Development of Non-governmental Organizations of the Republic of Lithuania[6] at the end of 2013. The law distinguishes NGOs of group benefit, when activities of organisation itself only work for the benefit of its members and the public benefit NGOs, when not only the participants, but also to the public or its part some activities benefit from

[6] Law on Development of Non-Governmental Organisations of LR. *Official Gazette*. 2013, No XII-717.

the activities[7]. Both of them are attributed to the area of non-governmental organisations. However, legitimization of these types enables to apply different support measures by differentiating between them.

Moreover, the above mentioned law states that a non-governmental organisation cannot pursue profit or political power, as well as religious aims; it is indicated that the state, municipality or legal entity in the non-governmental organisation cannot hold more than 1/3 of the votes in the general member meeting of a non-governmental organisation.

Strong and independent NGOs can serve the interests of the society in the areas of representation and fostering of democracy; and also fill in the "blank spots" of social services, assistance for groups at-risk, training and other areas of public interest. It should be noted that due to the specificity of their activities they are often more popular and pose confidence among customers. They can successfully reach the so-called problematic groups of the society and provide them with effective assistance (Stasiukynas and Žuromskaitė, 2014). Whitesman and Fernandez (2012) distinguished two main reasons of concern about the development of non-governmental organisations: 1) non-governmental organisations are not designed to increase the invested financial resources or return them to their owners. Non-profit organisations, despite having surplus of income, will continue to seek the organisation's goals, set new and higher ones with the aim to develop the idea of the organisation; 2) non-governmental organisations share a mission to support the public interest, contrary to profit seeking organisations that pursue narrow interests of their shareholders to increase profits and market share.

Considering the overview of general functions of NGOs and their aims, it can be claimed that NGOs can play different roles, which could be characterised as the following: 1) NGOs building social effect (service providing organisations, known as the supply non-governmental organisations); 2) operating in the area of interest protection, advocacy (seeking to influence public policy, spreading propaganda, called demand non-governmental organisations). It should be noted that commonly, the same NGO plays different roles, depending on the target group it has been established for.

[7] Under this Law, Art. 2, a non-governmental organisation is "a public legal entity, independent from state and municipal institutions and agencies, which acts on a voluntary basis for the benefit of society or its group, and which does not have the aim to seek political power or purely religious goals".

Preconditions for NGO management. Internal environment of an organisation is related to managerial models applied in the organisation, employees-volunteers, human resources of the organisation, etc., i.e., means that assist in reaching the set objectives. If individuals, participating in the "service production" of the organisation, will be competent, then favourable conditions for quality (successful) "service provision" in the outside environment (beyond organisation) will be created.

Operating efficiency of non-governmental organisations can be considered in various aspects. However, Lecy (2012) with co-authors, after having analysed more than 60 different scientific sources, have distinguished the following most common features pertaining to the effectiveness: (i) managerial effectiveness – leadership, human resources development, financial management, planning, etc.; (ii) the effectiveness of programmes undergoing implementation in general – not only the level of effectiveness of existing programmes should be evaluated, but also the organisation's impact in general should be defined; (iii) the efficiency of networks – it can be defined as an organisation's ability to mobilize the participants or to achieve its strategic objectives of participating in the network; (iv) legitimation and reputation – the organisation's name or its connection with projects can become the organisation's brand name, fund raising and gaining the power to influence policy-making, therefore, retaining impeccable reputation is the evidence of its legitimation.

Experience held by the organisation is commonly one of the NGO evaluation criteria. Analysis of good practice examples allows distinguishing positive and negative factors, influencing the activities of the organisation and developing its business strategy properly. Successful NGOs can perfectly demonstrate fruitful fundraising, good project management, transparency, accountability, involvement of members, the voluntary activity, public awareness campaigns, coalition-building and lobbying standards to other organisations (Bagdonienė et al., 2011). Also, these organisations have other interest groups recognition, for example, acting in children's non-formal education can be a partner with both, the public government institutions, as well as independent private service providers.

A leader plays an important role in NGOs and community cohesion and organisation of their activities (Schmitz, 2011), bringing together the core and leading organisation's members towards the defined vision. The importance of the leader is highlighted in all activity aspects of the

"third" sector, which in one way or another are related to human activities (Grigas, 2010; Nefas, 2007; Schmitz, 2012).

Drucker (1995) emphasizes that the organisation's mission is the basis of NGO activities; it reflects the values, beliefs and needs of the society. Strategy is not less important, since because of the loss of strategy the organisation will stop developing and eventually functioning.

Another important aspect for the successful operation of NGOs, which has already been mentioned, is organization's positive image (reputation), which indicates the success of organisation. The organisation may distinguish itself as fostering democratic processes, social services or other activities. In Western Europe, the NGO sector is a significant source of job creation (for example, unions of non-governmental organisations in Germany are considered to be major employers in the area of social services). Therefore, further development of the non-governmental sector will certainly have an impact on the country's economy (Žalimienė and Rimšaitė, 2007). It should be noted that the provision of social services, care of people in emergency situations are activities that are likely to be supported, engaging volunteers. Volunteers and sponsors of non-governmental organisations are much more attractive than the private or public sectors, thus NGOs, providing social services, can invoke alternative sources of financing their activities (Bode, 2003).

Exclusive position of NGO is from the human resources viewpoint, as the staff activities are based on voluntary work for which involved people receive intangible benefits (Salamon and Sokolowski, 2001). According to Wenzl (2006), one of the key words describing the NGO, indicating the specificity of these organisations, is a volunteer.

Thus, the biggest NGO asset is human resources. NGOs are often the first stepping-stone to a career and the opportunity to make new contacts (especially for young professionals) in non-governmental organisations. Moreover, a very important role in the organisation management is assigned to the staff (including volunteers), as employees come to this type of organisations not only to work, but also to contribute to the realisation of the mission and actively participate in problem-solving (Stasiukynas and Žuromskaitė, 2014). Particular significance acquires organisation leaders" (or other responsible persons) work with volunteers, motivating them, and teamwork. Problem solving is carried out in a team; involvement of more members of the organisation community consolidates the organisation

qualitatively (Čepienė, 2011). As members of the organisation often have different objectives, not necessarily coinciding with the overall goals of the organisation (Sanders and Kianty, 2006), sustainable team of the organisation is extremely important to achieve successful operation of an organisation. Juozaitis and Vilimienė (2000) believe that the best team-building tool is common development of the strategy by all participants of a non-governmental organisation. Čepienė (2011) argues that the decision-making in a team unites it and prepares for joint activities in addressing the problems. It is easier for a teamwork-based organisation to achieve its goals and attract like-minded people.

According to Kinicki and Kreitner (2006), people, working together in a team, making decisions, collectively forecasting realisation of a decision, are more interested in the achievement of a common goal, and then the decision realisation is the responsibility of all members, not a single leader. This methodology of work organisation builds opportunities to achieve much better results and meet the staff's secondary, higher needs (self-expression, recognition, etc.).

In discussion about the Lithuanian communities" activity factors and motives, Ališauskas with co-authors (2008) identified community activity support and activation as a significant factor that can be performed by both community leaders and active participants from the inside and the public at large and authorities from the outside (moral and financial support plays an important role). Aleksandravičius and Žukovskis (2011) identified the community's ability to be open and the ability to adapt to a variety of new conditions as a factor, which has a significant impact on the success of activity.

Based on case studies analysis of Lithuanian organisation management (Stasiukynas and Žuromskaitė, 2014), factors having impact on successful NGO activity have been distinguished: (i) communication, creativity, teamwork and other skills of leaders; (ii) organisation culture encouraging teamwork, creativity, self-expression and processes of democracy; (iii) volunteer-employers involvement, distribution of tasks and means of motivation; (iv) competences of the involved persons (work organisation, project and finance management, etc.).

Summing it up, community and non-governmental organisation activity areas, the most relevant to the organisation management can be identified:

- Leaders, organisation management;
- Recruitment and encouragement of human resources by involving into activities;
- Cooperation between members of organisation, teamwork;
- Organisation members" competences.

The highlighted aspects of management create preconditions for further empirical research into community and non-governmental organisations.

1.5.2. Development of Community and Non-governmental Organisations in Lithuania

The breakthrough in the development of community-based organisations, as well as non-governmental non-profit sector in general in Lithuania, should be related to the declaration of independence. In Lithuania, the number of NGOs had been growing up to the Second World War. However, after the loss of independence, the situation changed, the government limited civil initiatives: only public organisations and cooperatives survived (Šimašius, 2007).

The Soviet period has had a negative impact on non-governmental organisations not only in Lithuania, but also in other post-Soviet countries (Marček, 2008). Only after the collapse of communism in these countries, new opportunities for the civil society and NGO development have opened up. As recent research studies carried out in the former Soviet Union republics have revealed, the only possible way to revive the civil society was the restoration of national identity and trust between citizens (Kėrytė, 2010).

After the restoration of the independence by the referendum, a new Constitution of the Republic of Lithuania was adopted (1992), which set the legal foundation of the "third" sector formation. According to the Constitution of the Republic of Lithuania, citizens must be guaranteed the right to freely form societies, political parties and associations, provided that the aims and activities are not contrary to the Constitution and the law[8].

After Lithuania had regained its independence, patriotism, nationalism, sense of public initiatives were prevailing in the state. Ideas of sobriety received a strong echo in the society (non-intoxicated, sober-

[8] Constitution of LR. Chapter 2, Art. 35. *Official Gazette*. 1992, No. 33-1014.

minded nation, unaffected by the "imposed ideology"). NGOs that had functioned before World War II were re-established (e.g., "Federation of Ateitininkai", "Lithuanian Scouts" and others) and non-formal civil initiatives, which had operated in the underground, were formalized (e.g., "Social service volunteers", LCYTU "Žingsnis" and others). Ideologically driven organisations, such as "Spaliukai", "Pioneers" and similar ones, lost their popularity. Therefore, active young people, in particular, have been looking for new activity niches or areas that were consistent with the prevailing spirit in the society.

Worth mentioning is the fact that Western countries (Sweden, USA, among others) have made an important contribution to the development of communities and NGOs by providing financial and other support. Ideas and methods of new (unusual) activities whelmed Lithuania. Meaningfulness of social activities and purposeful employment carried out in different, non-traditional ways were very attractive to young and proactive people.

Overview of regulations of voluntary organisations established between 1992–1997 reveals that nationalism, patriotism, help to a close person, sobriety and similar values were the dominating ones (Stasiukynas and Žuromskaitė, 2014).

Several stages should be distinguished whilst analysing the legal framework of the establishment of non-governmental organisations, their evolution. In 1992, the Government Resolution on the "Approval of the main provisions of non-profit organisations (companies)" was the adopted. On the basis of this document, first NGOs were registered (about 260 organizations)[9]. A few years later, in 1995, the Law on Public Organisations of LR[10] was adopted, later, in 1996, the Law on Public Establishments of LR[11], the Law on Associations of LR[12] and the Law on Charity and Sponsorship Funds of LR[13] were enacted. Noteworthy is the fact that the majority of civil organisations had been established following the Law of Public Organisations of LR until 2004, when this law was abolished. Then, organisations had to undergo re-organisation according to the provisions

[9] Policy of Non-governmental Organisations. Ministry of Social Security and Labour [interactive]. [accessed on 2014-09-05]. <http://www.socmin.lt/lt/nevyriausybiniu-organizaciju-sektorius.html>.

[10] Law on Public Organisations of LR. *Official Gazette*. 1995, No. 18-400.

[11] Public Establishments. *Official Gazette*. 1996, No. 68-1633; 2004, No 90-4063.

[12] Law on Associations of LR. *Official Gazette*. 1996, No. I-1231.

[13] Law on Charity and Sponsorship Funds of LR. *Official Gazette*. 1996, No 32-787.

of the Law on Associations. It should be noted that none of these laws set the provision on non-governmental organisation. The situation changed in 2014, when the Law on Development of Non-Governmental Organisations[14] came into effect, where the NGO was defined and essential features were distinguished.

European non-governmental sector is regarded as one of the fastest growing sectors (Domanski, 2010). In Lithuania, the sector has also been expanding quantitatively (in 1995 there were 260 registered organisations, while in 2005 – about 15 000). Various financial mechanisms encouraged to join the NGO sector and contributed to its consolidation: pre-accession to the European Union (PHARE program) and then mechanisms enhancing the European Union and European Economic Area member states. A significant impact on the development of rural communities had the rural communities support schemes. However, even today, the number of NGOs and their activities depend on the country's economic and political situation (Matonytė, 2003). It must be stressed that slower development of non-governmental organisations in Lithuania was influenced by Lithuanian political passivity (Kėrytė, 2010) and lack of authoritative personalities and their influence (Guogis et al., 2007).

Moreover, there is no unified statistical database of the NGOs accounting in Lithuania and a large proportion of registered organisations are not carrying out any activities. The main reason is that NGOs are based on voluntary work, and there is no systematic funding of organisations in the country. However, official termination of such organisation activity and deregistration will require additional resources.

1.5.3. Evolution and Traditions of Management in Community and Non-governmental Organisations in Lithuania

Further analysis focuses on organisations, participants of the empirical research, activity over 20 year-period according to managerial factors, identified in the first part of the chapter (organisation leaders, organisation management; human recruitment and encouragement of human resources by involving into activities; cooperation between members of organisation, teamwork, organisation members" competences).

[14] Law on Development of Non-Governmental Organisations of LR. *Official Gazette*. 2013, No. XII – 717.

Empirical research sample. Organisations selected for the research were the ones with good practice experience in their activity development and being supported by the public institutions and state authorities.

CNO1 – community organisation established in 2002 and characterized by its development both quantitatively (over the past decade, the number of members has doubled and in 2014, it has counted over 10 000 members) and by the conducted projects on infrastructure and other areas (on the basis of public-private partnership, general education school has been built and realized; park of mythology; successful organisation of cultural, sport and active leisure time events; conducting projects of safe neighbourhood, promotion of citizenship and social entrepreneurship and other projects).

CNO2 is an association established in 1992 (re-registered in 1997) uniting the largest Lithuanian non-governmental organisations that foster the temperance ideas and guide their activities toward education of a civic personality, capable of self-selection and addiction-free. Members of CNO2 are Bishop V. Valančius" "Movement of Temperance" (over 4700 members), Lithuanian Christian Youth Temperance Union "Step" (over 1000 members), "Baltų ainiai" (over 400 members), Society "Šalpa". CNO1 actively cooperates with both international foreign organisations (Swedish "Hela manniskan" organisation, Irish organisation "Community Awareness of Drugs", "Nordic countries Alcohol and Drug Prevention Organisation" (NordAN), global Kettill Brunn Alcohol Research Association, Chicago Medical Centre, USA) and national organisations and public institutions (The Committee on Health Affairs of the Seimas of LR, Commission for Prevention of Drug Addiction of the Seimas, the Ministry of Education and Science, Vilnius Child Protective Services, Vilnius Education Department, Vilnius Pedagogical University of Education, Šiauliai Pedagogical University, Klaipėda University, Teacher Professional Development Center, the State Mental Health Centre, the Lithuanian Catholic Academy of Science, etc.). CNO1 has carried out over 40 projects and 13 different programmes. In 2009-2010, CNO1 carried out a subproject "Sober Generation" as part of the financial mechanisms subsidy scheme of the European Economic Area and Norway project "Strengthening NGO Sector in Lithuania".

CNO3 was established in 1997, with a pursuit of bringing together young people and social management methods organisation working with young people, their activities aimed at developing youth self-expression, creativity and healthy lifestyle. Over the last decade, the organisation

has grown from a few hundred to a thousand and more members, and it operates in different municipalities in 20 departments throughout Lithuania. By cooperating with the "International Snowball Association", it consults and supports volunteering organisations carrying out similar programmes in Europe (Poland, Latvia, Belarus, etc.). The organisation is well-known in the society and among professionals for its successfully implemented addiction prevention programmes (known as "Snow Ball" (Operation Snowball) programme). It should be noted that CNO3 has received commendations and awards for their usefulness to the society, among them – acknowledgment by the Vilnius Youth Organizations Union "Round Table" for a meaningful project (Snowball) in Vilnius in 2006. The Drug Control Department entitled this project as the best project in the area of psychoactive substance use prevention. CNO3 during that particular period showed up in the following areas: healthy living, education of social skills and the promotion of the idea of volunteering, volunteer training; people from social risk groups were involved in events organised for children and young people; organising events for children in day care centers, orphanages, etc.; community, democracy, and promotion of other inherent values of citizenship content, etc. CNO3 is also active in civic-political dimension – publicity of suggestions and communication with the members of the Seimas on the issues under consideration in the area of Alcohol policy; participation of members of the organisation in the Seimas Committee meetings and expressing their standpoints; participation in civil actions, organised by the social partners or organisation of similar actions (e.g., public campaign "Disarm" ("Nusiginkluok")).

Thus, successful implementation of the selected organisations visibility and favourable assessment of related projects, as well as civic activity of members within organisations, suggest that activities of CNO1, CNO2 and CNO3 during the analysed period were beneficial to the public, creating a positive social effect, and can be attributed to the cases of good practice.

Seeking to identify changes of a particular organisation in the course of history and its possible trends, the particular years (1994-1998; 2004; 2014) were selected, during which the situation within the organisation was examined according to the certain management aspects. Then, these aspects were summarized and identified trends were formulated. It should be noted that only CNO2 (founded in 1992) could be analysed for the selected period; meanwhile, CNO1 (founded in 2002) was researched in the last decade.

Results of the empirical research. Peculiarities of activity of the selected organisations related to the direct operation of the organisation led to the management specificity. However, the research has led to the general trends in accordance with the management aspects, which are presented in Table 1.

CNO1 can be distinguished as engaging local residents to solve community problems and plan joint cultural events. Like in other NGOs, the leadership role is important as well as planning and coordination of different activities. In the later stages of the community life, when the organisation was expanding, the need in special competences in relation to large-scale project management, financial management and strategic planning became evident.

CNO2 was established after Lithuania had regained its independence. It focused its activities on support to organisations promoting healthy lifestyles and public policy. Since its beginning, the organisation has experienced a great need in competences related to clerical work, project management, communication between organisations, public policy formation and expertise of its implementation. On the basis of foreign funds support to strengthen the "third" sector of Lithuania and other NGO members" competence development (working directly with vulnerable social groups), the organisation has developed its competences through large-scale project implementation (over 100 thousand Litas). So, efficacious skills of project development and implementation, as well as abilities related to teamwork, have been identified. However, concentration on existing projects and efforts to strengthen cooperation with the authorities has led to a reduced emphasis on development of new leadership and that caused limitations on smooth implementation of the subsequent projects respectively. Regular (daily) co-operation of CNO2 with the organisation's associate members (organisations) was not relevant; therefore, traditional communication channels (e-mail, phone) prevailed.

CNO3 was established as a group of like-minded, which was mainly concentrated in the direct implementation of its activities. In order to implement project activities, besides the project management competences, human resource management was important, particularly work with volunteers, attracting and involving them into activities, maintenance of close communication. Communication and teamwork competences played a major role in the work with human resources.

Strategic planning methods were started to be implemented by CNO3 before 2004. However, the full process of strategic management is often hampered in the implementation stage. One of the main problems is lack of new leaders" development and motivation to implement assumed responsibility over a longer period than a calendar year.

All the surveyed organisations from their beginning were more focused on the content of direct activities and with less emphasis on the activities related to professional management processes. This led to difficulties in the process of organisational expansion and larger projects implementation. However, the above mentioned organisations dealt with these challenges in a creative way by improving new members" competences through special training of management field (CNO3 in particular). It is likely that in the context of globalization and close mutual cooperation of community-based and non-governmental organizations the need for improvement of the competences related to communication and cooperation will be increasing.

Analysis of CNO1, CNO2 and CNO3 by the periods in question evidences the role of digital technologies in the management of organisation's activities and communication (both internal, among members and between organisation, and external environment). Identified trends suggest that digital technologies will create opportunities for more efficient implementation of an increasing number of community-based and non-governmental organizations activities.

CNO3 was characterized by more frequent use of social networks. This trend could be explained by the organization's specificity – the majority of members (over 70%) are young people (14-29 years old), actively using digital technologies in everyday life. Since CNO3 unites young people in more than 20 organisational units (throughout Lithuania) and aims to strengthen cooperation between departments, various online platforms are being created, allowing all members of the organization to monitor the activities of different departments, to register individually to the events of different departments, etc. Dissemination of information and communication has become a strategic priority for CNO3 activities.

When assessing the activities of the organizations in attracting and integrating new active members (volunteers), a tendency has been observed: the success of the organization's activity resulted in a greater trust by the state government and led the organization to carry out large-scale (state-demand and similar) projects. However, this caused related obligations. Then, the

organization's most competent human resources were recruited to deal with these obligations. In this period, the organization became more oriented to the "provision of ordered services" rather than the organization's human resources quantitative development and their support. If the discussed projects did not plan attracting new members and volunteer education and integration into organisational culture, organizations experienced members "drop outs". Such projects would only reinforce team operators" competences, created non-public recognition of an organization. Yet, this organization's activity in the democratic processes and representation of members" interests diminished, as well as the number of potential new organization's leaders reduced. When the team leaders resigned, there was a problem of finding competent leaders to change them. Thus, this trend shows that for the organizations to maintain their active citizenship and democracy in terms of a focused and to continue the mission of the organization, it needs a balance between project activity (demand from outside) and work with members and organizational culture development. The paradox is that organisations are forced to take on attracting the projects (based on contracts from the outside) organisation's activity due to financial needs, necessary for an organisation to survive, but at the same time, this process can cause danger to the future viability of the organisation.

The presented summary table (see Table 1) is based on the overview of the development of Lithuanian community and non-governmental non-profit organisations along with the empirical research findings of the above mentioned organisations" management experience. The table embraces the management features and trends of the community-based and non-governmental organisations according to the distinguished aspects.

Table 1. Management features and trends of community and non-governmental non-profit organisations

Management aspects	1994-1998	2004	2014
Leaders of organisations, organisation management	Domination of activeness in different activities, citizenship-oriented persons among the members.	Problem of activity continuity is encountered more often and growth of leaders and their education are identified as its probable solution.	Activity continuity problem remains. Management methods are better adapted (than before) for the third sector.

	Management methods are applied intuitively, activity for a longer period.	Depending on the leaders and professional management techniques specific to private or public sector, management can be applied. Part of the organizations develop strategic plans, though implementation is more spontaneous than planned.	Organisations more often carry out strategic planning and its implementation.
Mobilization of human resources and their involvement into activities	Members come together to organisations on voluntary basis, more on ideological basis, through personal contact members. Special involvement methods do not apply. Getting involved in public and local community solutions spontaneously, according to needs.	Potential members have a wider choice between different organizations. These have to compete for members. A large part of the members are migrating between organizations and participating in different events, but contributing little to organization's development. NGO members are involved through organisations" events; personal contact members; publicly available information on organizations" websites. Simple means of attracting members and motivating them are planned and applied.	Organizations apply innovative ways of involving more members, analyse members" needs in more detail in order to engage them and motivate to participate in activities. A large part of members are migrating through organisations and participating in different events, but contributing little to organisation itself. NGO members are involved through promotional events; personal contacts of members; open access information available on organizations" websites, social networks. Looking for more innovative ways to attract new members.

Co-operation among members of the organization, teamwork.	Collaboration and teamwork occur naturally, for identification with the organization and sense of common goals. Communication conducted orally, landline phone and letters through the national post.	Application of team building techniques. More emphasis on cooperation and communication efficiency. Communication channels supplemented by websites of organisations, forum on sites, e-mail (e-mail-based e- conferences), mobile phones. Conventional mail and stationary phones used more to maintain official contacts.	Team building techniques are applied. Attention to members" cooperation and communication is increasingly supplemented by communication with outside of organisation. Social networking platforms are dominating among communication channels; e-mail; various digital applications of mobile devices are applied. Websites and electronic conferences (e-mail-based) less used; forums even less frequently. "Conventional" post applied only in exceptional cases.
Organisation members" competences	In terms of competence, the education system representatives prevail, little attention is given to professional development.	There are members who have more years of experience in organizations. Members are encouraged to upgrade their competences related to the content of organisation and subject-specific competences (e.g., project development, finance accounting, etc.).	Going deeper into organization members" competences and their weaknesses. Next to professional competences, development of generic competences is encouraged (e. g., leadership).

Source: developed by the author

After having examined the activity goals of community-based and non-governmental non-profit organisations, the main management issues, affecting the organisation's successful (efficient) activity, can be distinguished: 1) leaders of organisations, organisation management; 2) human resource mobilisation and activation (motivation) by involving

into activities; 3) co-operation among members of the organisation, teamwork; 4) the organisation members' competences. After having overviewed the evolution of community-based and non-governmental non-profit organisations in Lithuania, it can be claimed that both factors – national (legal basis for establishment of organisations, citizens' desire to deal with both the local community and the general public issues) and external/international (to mention foreign countries' support to the third sector) – have had an impact on the growth of organisations in number. Yet, Lithuanian civil society is in the process of its creation. Therefore, public administrations' role in the creation of the most favourable conditions for the "third" sector development is one of the key importance.

Examination of continuity of the selected community-based and non-governmental non-profit organisations activity, the major trends in the management of such organisations can be identified:

1) The organisation's activity continuity problems because of insufficient training of new leaders remain as important, but new innovative methods are being introduced; organisations increasingly apply strategic planning methods;
2) More innovative management practices related to social networks and mobile electronic technologies of members' involvement and motivation are applied;
3) Social networking platform, e-mail, various digital applications on mobile devices are dominant among channels of communication;
4) The organization members' competences and their needs are to be analysed in more detail.

Due to existing support mechanisms to the non-governmental sector in Lithuania, organisations seeking to maintain a minimum material base (premises, office equipment, etc.) must carry out external project activities, which can strengthen organisations' public image and competences of involved individuals. Yet, there is a risk to depart from the organisation mission's implementation and attraction of new and potential organisation leaders as well as organisational culture and fostering key values. As a result, in the long run this leads to overall organisation's potential fragility.

Taking into consideration management trends of the researched community-based and non-governmental organisations, the following assumptions about management perspectives can be made: 1) mutual cooperation between community-based and non-governmental organisations will

increase the need to improve communication and cooperation competences in the context of globalisation; 2) innovative management methods of human resources corresponding to the changing trends of organisational environment and members' competences will increase; 3) the need for digital content technological tools for organisation management will expand.

The empirical results of the study revealed the shortcomings (gaps) of management in the "third" sector organisations in relation to human resource management (especially in attracting new members, motivating them, and leadership development). The current situation appears to be due to the specificity of the "third" sector comparing to private management or state governance. Therefore, seeking to enhance human resource potential of community-based and non-governmental organisations, it is advisable to develop research in the field of management, allowing greater emphasis on specificity of the "third" sector and adapted management tools, as well as creating opportunities for rendering good practice.

Management trends, identified by the study, imply recommendations for the state government which aims to develop the "third" sector and foster citizenship, to implement a more targeted activity and pay greater attention to enhancement of community-based non-governmental organisations competences, in relation to: (i) communication through digital technologies; (ii) strategic and (iii) human resource management.

In order to enhance the civil society based on non-governmental organisations, more active involvement of public authority administrations would be recommended. This would create minimum existence conditions for these organisations, allowing not taking part in project implementation (contract-based services from the outside).

1.6. Contemporary Contexts and Trends in Citizenship Studies

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The citizenship phenomenon is ambiguous and strongly correlated with cultural and historical determinants. The question that arises is

whether citizenship can be defined as part of systematic research that respects the contemporary contexts in which citizenship appears and increases our understanding of the concept. This article reviews the main trends in social sciences, in particular psychology, which deal with the concept of citizenship. It analyzes citizenship as a social and personal category as well as a category that is rooted in everyday life. Special emphasis is placed on the latter in a discussion of the relationships between civic engagement, social and intellectual capital, trust and individual resources.

Citizenship is one of the most frequently discussed concepts in various disciplines of science (Invernizzi and Wiliams, 2009; Percy-Smith and Tomas, 2010). For many years, it was confined to the realm of political science and sociology. In recent years, psychologists and educators have joined the debate on citizenship. They have pointed out that citizenship is an ambiguous and contextual concept that is strongly correlated with cultural and historical determinants (Melosik, 1998). In a time of war, the definition of a "citizen" is saturated with patriotism and is reminiscent of the *citizen-soldier* concept. During post-war reconstruction, it approximates the notion of a *citizen-constructor*, whereas in a time of disaster, it comes closer to the concept of a *citizen-rescuer* who helps the needy, during serious reforms – the notion of a *citizen-reformer*, and in a time of peace and stabilization – the concept of a *citizen-employee* (Melosik, 1998). The question that arises is whether citizenship can be defined as part of systematic research that respects the contemporary contexts in which citizenship appears and increases our understanding of the concept. The very idea of citizenship does not exist outside individuals. It is individuals who, in various social contexts, undertake activities characterized by various levels of civic engagement. The mechanisms behind civic attitudes and civic engagement have to be yet understood by social scientists. This article reviews the predominant scientific trends that deal with citizenship: (1) sociological – with reference to differences between communities, (2) personal – with reference to differences between individuals, and (3) focused on activity – with reference to specific types of civic engagement.

Citizenship as a social concept. Social psychologists and sociologists investigate citizenship from the point of view of the characteristic features of a given community. The proposed models describe societies that create various types of space for civic engagement. The model developed by Herbst (2005) presents possible types of civic communities in reference to two

dimensions of social life: autonomy and individualism vs. collectivism. The autonomy dimension defines the strength of connections between a civic society and central institutions. The individualism/collectivism dimension is related to the "roots" of citizenship which can stem from personal values or collective values that are respected by the entire society, such as the concept of the common good. Herbst proposed four civic society models that are based on the above mentioned dimensions:

- **Classical citizenship model,** which is related to personal values and high levels of autonomy. In this model, individuals are characterized by high levels of civic awareness; they abide by universal values, respect the law, contractual provisions and vote in elections. They respect social norms and have an interest in public affairs;
- **Mobilization model,** which makes a reference to personal values and identifies the relations between different spheres of social reality, such as the market or profit. In this model, individuals are efficient and enterprising. They build social capital and are eager to take matters in their own hands. Their civic attitudes are reflected mainly through economic activity and mutual help as part of social support networks;
- **Associative model,** which is based on collective values and is characterized by high levels of autonomy. This model counterbalances the omnipotence of the state. Citizens are more involved in non-governmental organizations and associations, and civic activities take place outside state structures. Citizens monitor government performance, initiate protests and navigate change;
- **Community model,** which is also based on collective values, but makes a reference to social ties. It applies to small and integrated territorial communities with strong links between members. In this model, citizens uphold social ties, group identity and the existing order. They represent the community in state organizations, such as political parties. They run for public offices and participate in projects initiated by the local authorities.

The models proposed by Herbst enable the classification of diverse approaches to citizenship. They describe various types of civic activities, but do not support the unambiguous classification of civic attitudes and actions. This opportunity is offered by two successive approaches.

Citizenship as a personal concept. In the 1990s, Theis-Morse (1993) researched modern perceptions of the role played by citizens in a society. Her classification was one of the first attempts to describe the attitudes of community members toward the state. Theiss-Morse identified four types of citizens characterized by different attitudes and levels of civic engagement:

- **Passive or non-engaged citizen** – an alienated citizen who does not take an interest in public affairs or politics. He/she places the fate of the nation and the society in the hands of the government, accepts its decisions and solutions, but has no interest in how the authorities operate or what they do;
- **Semi-active citizen-voter** – a person who has an interest in politics and public affairs, searches for important information and develops an understanding of local affairs. The semi-active citizen consciously selects candidates in elections, but is not personally involved in political or social activities;
- **Active citizen-activist** – a social activist and a rebel who does not trust the authorities or political leaders. The active citizen monitors government performance and actively lobbies for the protection of civil rights. He/she is a member of protest movements that aim to instill change;
- **Active citizen-representative** – an activist who works on behalf of the state. He/she represents the interests of specific groups, organizations and institutions, and lobbies for solutions that improve their living and operating conditions.

Theiss-Morse developed the above typology based on the results of research into civic attitudes. The main limitation of the proposed system is that it relates to perceptions of the role played by citizens rather than behaviors that citizens can and are willing to adopt to further the interests of the state, community and individuals.

In recent years, attempts have been made to analyze citizenship in terms of specific types of civic behaviors manifested by individuals.

Citizenship as a concept rooted in daily life. The definition of citizenship as a concept that manifests itself through active behavior is promising for at least two reasons.

Firstly, it emphasizes changes in our perceptions of a citizen's role, which evolved from subordination and responsibilities towards state authorities to active participation in public life. Social and economic

changes of the past decades, such as international migration flows, growing awareness about individual rights, in particular in relation to discriminated groups, changes in women's role in society, globalized economy and population growth, breed new social problems, while the existing problems are exacerbated on an unprecedented scale. People are faced with conflict, violence, racism, terrorism, poverty, unemployment and environmental pollution. The offered solutions escape state and political governance, and they are increasingly more dependent on social attitudes towards those problems, in particular daily activities that can be undertaken to resolve the most pressing issues (Kerr, 1999). Also, today, citizenship, perhaps above all, denotes daily activities which are initiated to address problems arising from global phenomena (Davies and Issitt, 2005).

Secondly, there is a wealth of evidence to suggest that civic activity is positively correlated with indicators of economic and social welfare. In recent years, the active-passive dimension (Lewicka, 2008) of citizenship has attracted the interest of researchers from various scientific disciplines. The representatives of medical science emphasize that an active lifestyle delivers numerous health benefits; psychologists and sociologists claim that social, occupational and political activity contribute to the welfare, whereas economists argue that enterprise drives prosperity. The results of psychological research point to the presence of correlations between values that encourage activity and indicators of objective quality of life and prosperity (see Hofstede, 2001; Inglehart, 1998; Lewicka, 2005; Schwartz and Bardi, 1997). Positive correlations with democratization and civil liberties have also been observed (Skarzyńska, 2002, 2005). Positive psychologists emphasize the importance of an active lifestyle, in particular in the over-personal dimension (Seligman, 2002). They argue that social orientation and active efforts to make one's own life meaningful and good are crucial factors on the road to happiness. It can be assumed that individuals' willingness to become involved in local affairs will contribute to social welfare and prosperity.

The definition of citizenship as an activity is represented by numerous research concepts. Three concepts, which propose classification systems for civic activities and describe the mechanisms that drive civic engagement, are discussed below.

Citizenship activity vs. social and intellectual capital. Maria Lewicka (2004) identified three types of civic engagement: (1) protest,

participation in demonstrations, expression of discontent by collecting petition signatures, (2) constructive action on behalf of local communities, residential estates or workplaces, and (3) general civic engagement involving both protests and constructive action. According to Lewicka, the identified types of social behaviors result from various configurations of different factors. Citizens undertaking constructive activity are characterized by high levels of social resources, manifested by strong neighborhood ties and attachment to the place of residence. Persons involved in general civic activities demonstrate higher levels of intellectual resources manifested by education, broad interests and less emotional ties with the place of residence. Lewicka identified two paths that lead to civic engagement: emotional/social and intellectual. They are activated under different conditions and can promote an interest in public affairs and varied types of activities.

Citizenship activity vs. trust. The study by Torney-Putra (2008), conducted on a massive population of 90,000 young people from 28 countries, delivered highly interesting results. The cited author initially identified two types of civic engagement: conventional political participation and community participation. The former is related to a state's political structure, general interest in public affairs and national history, systems of governance and readiness to participate in public life by voting in elections and running for office. The latter one covers less formal behaviors, such as participation in protests, volunteering, working for human rights or environmental organizations. Torney-Putra et al. (2004) demonstrated that all civic behaviors are correlated with the level of trust vested by young people in the local community (e.g., school principals, chefs in local restaurants), friends, acquaintances and family. Conventional civic participation, such as membership in a political party, is determined mainly by trust in the closest people, such as parents, and perceived self-efficacy (Torney-Putra et al., 2004). Voting in elections represents a specific type of civic participation which is governed by somewhat different factors. It is more likely to be determined by citizens' trust in the government and the availability of information about the elections and the voting procedure, i.e., the level of civic knowledge.

Citizenship activity vs. personal resources. The broadest typology of civic participation was proposed by Zalewska and Krzywosz-Rynkiewicz (2011). Drawing inspiration from a study by Kennedy (2006), the cited

authors relied on the concepts developed by Theiss-Morse, Lewicka and Torney-Putra (presented above) to formulate a model of civic engagement based on six types of citizenship (Zalewska and Krzywosz-Rynkiewicz, 2011):

1. **Passive citizenship,** involving behaviors that are an expression of national identity, sense of belonging to a state or nation, respect for national symbols and patriotism;
2. **Semi-active citizenship,** which is expressed by loyalty to the state and state institutions, as well as occasional participation in elections (voting);
3. **Active social citizenship,** which is manifested by volunteer work on behalf of the environment and the local community, representing the local community and solving local problems;
4. **Active political citizenship,** which involves willingness to participate in governance by joining a political party or running for office;
5. **Active citizenship for change,** which is manifested by attempts to monitor government performance, questioning the existing order, legal and illegal protests;
6. **Active personal citizenship,** which strives toward personal development, independence, financial sustainability and enterprise.

The above mentioned authors also introduced the concept of general civic participation which is manifested by personal involvement in local affairs.

The proposed model can be used to measure and describe various types of civic activities identified by scientists who represent different lines of thought (sociological, psychological and focused on activity). Zalewska and Krzywosz-Rynkiewicz made a vital contribution to the definition of citizenship as part of their systematic research into personal resources that foster citizenship activity. Previous research, including the studies cited in this article, were more likely to focus on social circumstances and mechanisms that influence civic attitudes and behaviors and they generally disregarded personal resources. Some single research focused on particular aspects of citizenship, e.g., relationship between personality and political behavior (Gerber et al., 2011; Mondak et al., 2010, 2011; Russo and Amna, 2014) or civic engagement (Kanacri et al., 2012). Zalewska and Krzywosz-Rynkiewicz demonstrated that individual resources can promote complex

citizenship activity (in its political, social and personal dimension) or prevent individuals from acquiring the relevant experiences.

Zalewska and Krzywosz-Rynkiewicz analyzed individual resources at two levels: basic and specific personal traits. Basic characteristics are more strongly determined by biological factors (proposed by the trait theory), and they include temperament (Strelau, 1998, 2006; Zawadzki and Strelau, 1997) and the personal traits identified in the Big Five model (Costa and McCrae, 1992). Specific personal traits are more strongly influenced by environmental and cultural factors, and they involve motivational and social cognitive constructs relating to self, other people, the world and the future proposed by the social cognitive theory of personality (see Mc Adams, 2006). There were the following: values (Seifert and Bergmann, 1983), type of optimism (Czapiński, 1985; Stach, 2006; Holden, 2007), locus of control (Rotter, 1966, 1990; Drwal, 1980, 1995), mental toughness (Clough et al., 2002) and responsibility (Krzywosz-Rynkiewicz, 2007a, 2007b).

Research findings indicate that basic personality traits are less associated with various types of civic participation, although conscientiousness supports predictions of the intensity with which civic engagement is manifested. Specific personality traits are much more likely to influence civic participation, and they regulate civic behaviors more directly than basic traits. Constructs that support the achievement of goals, such as social optimism (belief that members of the community can effectively resolve local problems), individual responsibility and engagement, act as resources that prevent passive citizenship. The level of social orientation can predict behaviors aiming to generate over-personal benefits which are elements of semi-active citizenship and pro-social attitudes.

With age, personality traits become increasingly linked with civic engagement. In late adolescence, basic personality traits are more likely to determine civic participation than specific traits, whereas the reverse is observed in childhood. Age-related changes take on different patterns in various environments. Traits that prevent civic passiveness are more highly expressed in metropolitan residents. It can be assumed that small communities with limited opportunities for broad and repeatable social contacts (cf. Eliasz, 2002) promote behaviors that are based on mutual help and cooperation. In large urban areas, civic engagement is more likely to be determined by individual resources. The above mentioned facts imply that civic participation in small towns and villages is more

influenced by external circumstances. Civic engagement will be high if supportive factors persist, but local residents will shy away from civic involvement if local educational and social systems do not support such behaviors. In metropolitan areas, civic engagement is more internally regulated, and civic attitudes have a more subjective nature because they are more influenced by individual resources than external circumstances.

Conclusions. Contemporary concepts of citizenship are increasingly more complex, and they escape the narrow definition of a relationship between an individual and the state. The definition of citizenship as a contextual phenomenon that requires an understanding of individual's specific circumstances also fails to address the problem. The modern man is not confined to a single context but exists in different locations at the same time – he/she may live, work and relax in different regions, cultures or countries. In an information-driven world, citizens can be members of national, local, state, ethnic or global communities. For this reason, various approaches should be taken into consideration when attempting to define the concept of citizenship. The definition that focuses on civic engagement and civic behaviors seems to be most universally applicable. It facilitates better understanding of the activities, motives and driving factors in local communities. In the modern world, citizenship is not merely place-based, and it entails more than national identity. National identity is an important criterion, but it merely touches upon the modern concept of citizenship. Today, citizenship is more about critical analysis, decision-making and community-driven measures that resolve or prevent daily problems.

2. THE POTENTIAL OF COLLECTIVE INTELLIGENCE IN NETWORKED SOCIETY

In the second part of the monograph, various scientific approaches and perspectives regarding the concept of collective intelligence are integrated; theoretical insights are provided pertaining to the advantages and potential of collective intelligence to overcome social challenges and solve social problems; collective intelligence is discussed in relation to other intellectual forms; the existing and new emerging virtual societal projects and initiatives in international context are analyzed and generalized.

2.1. Theoretical Insights into Collective Intelligence

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"Study of collective intelligence in humans is a relatively new field, for which huge expectations are set, for example through speculations on the emergence of the Global Brain" (Heylighe, 1999). Wells offered a proposal to develop a world brain which encompasses all available information worldwide and makes it accessible to all people as a sort of mental clearinghouse for the mind: the depot where knowledge and ideas are received, sorted, summarized, digested, clarified and compared (Gore, 2013). What began as metaphor or utopia is now reality. Luo et al. (2009) describe collective intelligence as a "neural network" analogous to a human brain that is a network of the biological neurons. However, the study of the global brain may encounter great practical difficulties to model the entire human society as a "brain". Comparatively, collective intelligence is more investigable for two reasons, according to Luo et al. (2009): first, the size of a community is usually much smaller than that of the entire human

society so that the evolution of "intelligence" is more traceable; second, the members of a community usually have shared interests. For this reason, the study of collective intelligence might be a first step to building a vision of the "global brain".

The detailed overview of collective intelligence definition is given by Salminen (2012). Approaches to studying collective intelligence have been diverse, from the purely theoretical (Szuba, 2002) and conceptual (Luo et al., 2009) to simulations (Bosse et al., 2006), case studies (Gruber 2007), experiments (Woolley et al., 2010) and system design (Vanderhaeghen and Fettke, 2010). First studies that analyzed the phenomenon of collective intelligence were exploring its emergence in ant colonies (Kankanhalli et al., 2005), bee swarms and other animal communities. Insights from such research led to formation of algorithms for solving and optimizing complex computational problems (Dorigo et al., 1996; Thomas, 1975). The phenomenon of human collective intelligence is closely related to swarm intelligence, which means collective, largely self-organized behavior emerging from swarms of social insects (Bonabeau and Meyer, 2001). The major difference of the Swarm Intelligence in the biological world from collective intelligence is twofold, according to Lou et al. (2012). First, humans are knowledgeable and intelligent by themselves, while the elemental entities of Swarm Intelligence are usually with very limited intellectual capabilities. Thus, "the collective intelligent system is essentially a system of massive intelligent systems (i.e. human beings)" (Lou et al., 2012). Second, the interaction modes in a biological swarm are different from the modes in a human community. The emergence of Swarm Intelligence is the synergy-based interactions. In contrast, the interactions in a community intelligent system are knowledge-centered (Balis et al., 1967; Bonabeau et al., 1999).

Scientific society argues that in general human group demonstrates higher capabilities of information-processing and problem-solving than an individual (Heylighen, 2002; Luo et al., 2009). Collective intelligence is the general ability of a group to perform a wide variety of tasks (Woolley et al., 2010). Intelligence in groups emerges when each group member evaluates the overall situation and acts accordingly to achieve the overall goal (Leimester, 2010). A wide range of different aspects and components of "collective intelligence" which have been studied, at various levels, directly or indirectly, include the following criteria, according to Goyal and Akhilesh (2007):

- "social networks of individual and organization, social interaction, familiarity and interpersonal trust" (Chang and Harrington, 2005; Akgun et al., 2005);
- "group cohesion" (Wang et al., 2006);
- "diversity, strength of relationship, position in the network, group identification" (Van der Vegt and Bunderson, 2005);
- "strategic communities, self-organizing innovation networks, self-managing teams" (Rycroft and Kash, 2004);
- "inter functional linkages, public institution and policy frameworks, characteristics of the entire sociotechnical network of which a firm is part, informal ties and incubators" (Smilor, 1987; Lumpkin and Ireland, 1988); and "between university and industry" (Rothschild and Darr, 2005; Kreiner and Schultz, 1993);
- "shared governance, collaborative leadership or distributed leadership" (Bradford and Cohen, 1998; Spillane, 2007);
- "distributed intelligence, which arises from the collaboration and competition of many individuals" (Levy, 2010).
- "capability for a group of individuals to envision a future and reach it in a complex context" (Noubel, 2007).

In many respects, the concept of collective intelligence is nothing new (Hesse et al., 2011). Aulinger and Miller (2014) pointed out some critical aspects of the definitions thus far, since these definitions, from the viewpoint of definition doctrine, are not all that convincing. The following definitions, in their formulation, "can also be understood as the generation of a stadium wave at the World Cup". These concepts show that collective intelligence has been long used widely to solve various issues since it facilitates decision-making corresponding to various needs and reflecting the interests of the majority. Community meetings, shareholders meetings, even the decisions by legislative institutions (parliaments) are all adopted through the use of collective intelligence. The usefulness of this kind of decision-making is widely acknowledged by academic community as well, for instance, in scientific research (focus groups, the Delphi and other research methods, the essence of which lies in achieving common decision or opinion of individuals within a group) (Paražinskaitė and Tvaronavičienė, 2013). The weaknesses of these definitions are that they do not exclude anything that is collectively created, so they lose their

utility. Aulinger and Miller (2014) developed a first draft of a definition of Collective Intelligence: "Collective intelligence is the degree of ability of two or more living things to overcome challenges through the aggregation of individually processed information, whereby all actors follow identical rules of how to participate in the collective". What is essential is that the rules apply to and are followed by all actors. The majority of the forms of communal intelligence found in the real world, according to Aulinger and Miller (2014), are not a form of collective intelligence, "rather forms of team intelligence that are well known in corporations, football teams, orchestras and any other group acting in a specialized manner". Collective intelligence constitutes a very special form of communal intelligence which initial conditions exist much more rarely based on these initial conditions with the variety of settings (by collective or external), regulation of access (not regulated or regulated), connection between the actors (connected or not connected) and others (see Aulinger and Miller, 2014).

Volumes of literature published exhibit the growing interest in the field of CI, but despite some efforts (e.g., Luo et al., 2009; Gan et al., 2007; Malone et al., 2010), generally accepted frameworks for studying collective intelligence in human behavior either does not exist, or research is fragmented and lack of complex structure. Furthermore, due to the lack of a common framework, it is not possible to assess what is already known and to tie the efforts of different disciplines together (Salminen, 2012). There is diversity of concept definitions (e.g., "global brain", "team intelligence", "collective mind", "communal intelligence", "organizational learning", etc.) and there are different abstraction levels in the discussion about the phenomenon, according to Salminen (2012). Instead, excessive and incompatible definitions are used for key terms by various authors.

The term "wisdom of crowds" was coined by Surowiecki (2005) and it describes a phenomenon where, "under certain conditions, large groups can achieve better results than any single individual in the group". Surowiecki (2005) made an extensive research on collective judgment and intuition of crowd. Based on empirical investigation, the author argues that "under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them". "Wisdom of crowds" is derived not from averaging solutions, but from aggregating them. For example, the average of several individual "estimates can be accurate even if individual estimations are not" (Surowiecki, 2005). In other words, "the

many are smarter than the few" relying on the famous philosopher Levy (1997), "No one knows everything, everyone knows something, and all knowledge resides in humanity". To be intelligent, "a crowd should be diverse, judgments of its members should be independent, and there should be a way to aggregate the judgments (Surowiecki, 2005). On the other hand, even a minor social influence can decrease the accuracy of a crowd (Lorenz et al., 2011).

Diversity in groups of people usually refers to differences in demographic, educational and cultural backgrounds and differences in the ways that people represent and solve problems (Hong and Page, 2004). Wise et al. (2010) proved empirically that groups leveraging CI could outperform individual experts in a controlled set. Both a simulation model by Hong and Page (2004) and an experiment with human groups by Krause et al. (2011) have shown that under certain conditions groups of diverse problem solvers can outperform groups of high-ability problem solvers. Furthermore, the best problem solvers were biased in their estimations, while the group, as a whole, was accurate (Krause et al., 2011). Page (2007) proved using mathematical modelling and case studies that "power of diversity creates better groups, firms, schools and societies (The Diversity Theorem)".

As mentioned before, CI exists generally without the use of technology. "It is a conceptualization of a fundamental human tendency to do seemingly intelligent things in a Collective manner", as defined by Malone et al. (2010). Other phenomena might be connected to collective intelligence. For instance, promising results have been obtained from using theatre-based methods in relieving organizational issues (Pässilä and Oikarinen, 2011). As "improvisation theatre is about interaction", it can be hypothesized that theatre-based methods contribute to collective intelligence by influencing human interaction. Visualization tools for group work, such as sticky notes and shared visual templates (Sibbet, 2010), could be interpreted as shared, dynamic memory systems which facilitate the functioning of CI systems.

However, as long ago as in 1968, computer visionaries "foresaw the ability of computers to be applied to cooperation in creative endeavors by allowing people capable of solving specific problems to share their ideas" (Greg, 2010). With the growth and expansion of the Internet, "the way in which CI is utilized and leveraged has been fundamentally altered" (Wise, 2012). The new channels of communication and information

flow enable new possibilities to be involved in collaborative activities for broader groups of people in shorter amounts of time. Complex interactions of millions of users manifest themselves as a probabilistic phenomenon in a way that has even been compared to the workings of a brain (Pomerlau, 2009). "They go beyond the "one-to many" strategies of the broadcast age, to enable the "many-to-many" and the "many-to-one" strategies of the Web 2.0 age" (MIT Center for Collective Intelligence, 2010). "In the same way that multinational corporations have become far more efficient by outsourcing work to other countries and rob sourcing work to intelligent, interconnected machines, we as individuals are becoming far more productive by instantly connecting our thoughts to computers, servers and data bases all over the world" (Gore, 2013). Gore (2013) in his book "The Future" argues that the large complex systems include not only Internet-enabled objects, but humans, too. Human mind is also affected by accomplishments in technologies surrounding them. Example of that is provided by Gore (2013), "psychological studies shown that when people are asked to remember a list of facts, those told in advance that the facts will later be retrievable on the Internet are not able to remember the list as well as a control group not informed that the facts could be found online. Similar studies have shown that regular users of GPS devices began to lose some of their innate sense of direction". "Many of us use the Internet as an extension of our brain. Our societies, culture, politics, commerce, educational systems, ways of relating to one another – and our ways of thinking – are all being profoundly reorganized with the emergence of the Global Mind and the growth of digital information at exponential rates" (Gore, 2013). For S. Johnson (2012), "Internet" is much more than just a cheap way of sending Skype messages or adding photos. Rather, it is an intellectual template for how society itself should be reorganized; it is not "the solution to the problem, but a way of thinking about the problem". Thus, as Johnson writes, "one could use the Internet directly to improve people's lives, but also learn from the way the Internet had been organized, and apply those principles to help improve the way city governments worked, or school systems taught students". This can be seen as Schumpeterian creative destruction (Schumpeter, 1934), whereby the novel use of CI has changed the competitive landscape (Wise, 2012). The concept of collective intelligence is now being explored by businesses interested in innovation and by researchers interested in addressing systemic society problems.

New forms of collective intelligence emerge because of the web 2.0, 3.0 and social media tools, no wonder that interest in the field is rising (Salminen, 2012). Recent years have been very vivid in collective intelligence research field. Massachusetts Institute of Technology, one of the most reputed academic institutions of the USA, has established a center called the "MIT Centre for Collective Intelligence" for understanding and taking advantage of the phenomenon of collective intelligence. Some of the most notable outputs of collective intelligence, according to them, include Google, Wikipedia and InnoCentive. CI is becoming a new tool of collaboration for solving specific problems by sharing ideas. Malone et al. (2010) suggest that changes in the way intelligence is collectively developed were cause by diffusion of Internet applications and crowd harnessing mechanisms. Technological means, and especially the use of the Internet, "could help human communities evolve their collective capabilities in an unprecedented way and this is where collective intelligence systems especially come to place" (Lykourentzou et al., 2011). Organizations, such as Google, Wikipedia and Dell, have integrated applications of CI into our daily lives. For example, Larry Page, Google web search "understands exactly what you mean and gives you back exactly what you want" (Google, 2010) by leveraging the Collective Intelligence of the internet. "The algorithm Google use ranks the importance of respective web pages on the basis of the Collective actions of others on the internet and manages to present accurate search results as a result of their Collective Intelligence" (Wise, 2012).

Collective intelligence approach is a fundamentally different way of viewing how applications can support human interaction and decision-making. According to Greg (2010), most traditional applications have focused in improving the productivity or decision-making of the individual user. The emphasis has been put on providing the tools and data necessary to fulfil a specific job function. However, the current state of technologies allow more efficiency, for example, Wikipedia has no central coordination mechanisms and reward system for publishing articles and information (Travis, 2008). Under the collective intelligence paradigm, the focus is on harnessing the intelligence of groups of people to enable greater productivity and better decisions than are possible by individuals working in isolation (Greg, 2010). "The explosion of user-generated content referred to as Web 2.0, including blogs, wikis, video blogs, podcasts, social networking sites, streaming, and other forms of

interactive, computer to computer communication sets up a new system of global, horizontal communication networks" (Barahona et al., 2012).

Any situation "where large enough groups of people gather, act individually but also share some common community goals could potentially be – through the proper use of technology – transformed into a Collective intelligence system" (Lykourentzou et al., 2011). Collective intelligence systems vary significantly in nature, from collaborative systems, e.g., open source software development communities, and to competitive systems, e.g., problem-solving companies that benefit from the competition among participating user teams to identify solutions to various R&D problems (Lykourentzou et al., 2011). The concept of collective intelligence is closely related to many other existing conceptualizations, i.e., open innovation (Chesbrough, 2003); crowdsourcing (Howe, 2008); wisdom of crowds (Surowiecki, 2004); wikinomics and mass collaboration (Tapscott and Williams, 2006); and service dominant logic (Vargo et al., 2008). Exploitation of online media potential to leverage connectivity, responsiveness, creativity and innovation and co-creation of value with stakeholders is common for these paradigms (Wise, 2014).

Howe (2006) coined the concept of crowdsourcing and argued that crowds (i.e., informally linked groups of people external to the firm) have the potential to transform traditional organizational processes. "Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call" (Howe, 2008). Crowdsourcing became a famous concept mainly because huge corporations started to outsource their marketing campaigns while asking the crowd to create commercials, logos or even names of the products or services (Skaržauskaitė, 2012).

In an open collaboration model, organizations post their problem to the public at large through IT. Contributions from the crowds in these endeavors are voluntary and do not require monetary exchange. Posting on Reddit, starting a wiki, or using social media are examples of this type of collaboration (Prpic et al., 2014). Same patterns of open collaboration, innovation, and production can now be found beyond software. For example, people collaborate, sometimes with complete strangers, in user-to-user forums, mailing lists and online communities. Some share openly (and occasionally illegally) digital media: music, movies, TV programs,

software. People also share processing power and internet bandwidth, enabling free services, such as *Skype*, even host strangers overnight (Prpic et al., 2014). Companies have been affected by open collaboration, some negatively, others positively. The free encyclopedia *Wikipedia*, a prime example of such collaboration, has come to match the quality of *Encyclopedia Britannica* (Giles, 2005), which, after 244 years in circulation, has ceased printing. Other companies have been thriving by facilitating open collaborations, hosting forums and communities (Prpic et al., 2014).

Concept of Wikinomics (Tapscott and Williams, 2006) encompasses principles of openness, peering, sharing and acting globally. Open Innovation was introduced by Chesbrough (2003), who defined it as "valuable ideas that can come from inside or outside the organization and can go to market from inside or outside the organization" (Chesbrough, 2003, p.43). Open innovation centers around the notion that organizations cannot depend on their own in the age of vast and dispersed information. As a result of that, the boundaries between a firm and external environment have become more absorptive; innovations can easily transfer inward and outward (Wikipedia, 2014). Open Innovation could be seen as strategic direction of a business. "As such, Open Innovation has its roots in academia whereas Wiknomics, Crowdsourcing and The Wisdom of Crowds have their origins in the titles of popular mass media books" (Wise, 2012).

Swift expansion of Internet-based communication tools created a favorable environment for organizations to reach out to customers. Changing technologies changed customers" role, too; hence, they are able not only to consume in new and diverse ways, but also to influence organizations when developing and improving products, services and experiences of consumption (Skaržauskaitė, 2012). In 2000, Prahalad and Ramaswamy observed the move of customers from being passive audience to active co-creators of value. Vargo and Lusch (2004) investigated the phenomenon further, observed the way marketing was studied and practiced during the 20th century and introduced a concept of Service Dominant logic (SDL) focusing on customer-centricity and relationships development between consumers and organizations through dialogue and ongoing interaction (Skaržauskaitė, 2012). SDL sees the customer as an operant resource capable of acting on other resources and a collaborative partner who co-creates value with the firm (Vargo, 2008) rather than being just a consultant or a resource for ideas. Paradigms of CI and co-creation bear similarities in the

way they perceive creation of value, i.e., creation of greater "value" could be achieved by engaging a broader group of contributors, such as customers or end users (Wise, 2012). Social media plays an important role in both processes of CI emergence and co-creation of value (Graham et al., 2009).

Each attempt to systemize knowledge and conceptualize phenomenon leads to a promising future of CI's purposeful application and effective employment in society life. The broader notion of CI can be seen as something, which has been prevalent throughout history. We define collective intelligence, basing on Malone's (2010) definition in this monograph – the general ability of the group acting collectively to perform a wide variety of tasks. This kind of collective intelligence is a property of the group itself, not just individuals in it. Later theoretical insights will be based on Salminen (2012), who identifies 3 levels of CI. At the micro-level, collective intelligence is a combination of psychological, cognitive and behavioral elements. They provide the "rules", according to which individuals act (trust, motivation, etc.). Micro-level sets humans apart from other CI systems (robots, algorithms, etc.). At the macro-level, collective intelligence becomes a statistical phenomenon, at least in the case of the "wisdom of crowds" effect (Lorenz et al., 2011). The level of emergence resides between the micro-level and the macro-level and deals with the question of how system behavior emerges from interactions at the macro-level and the micro-level (more about dimensions of CI in Chapter 3.2.).

2.2. The Value of Collective Intelligence for Internet Enabled Society

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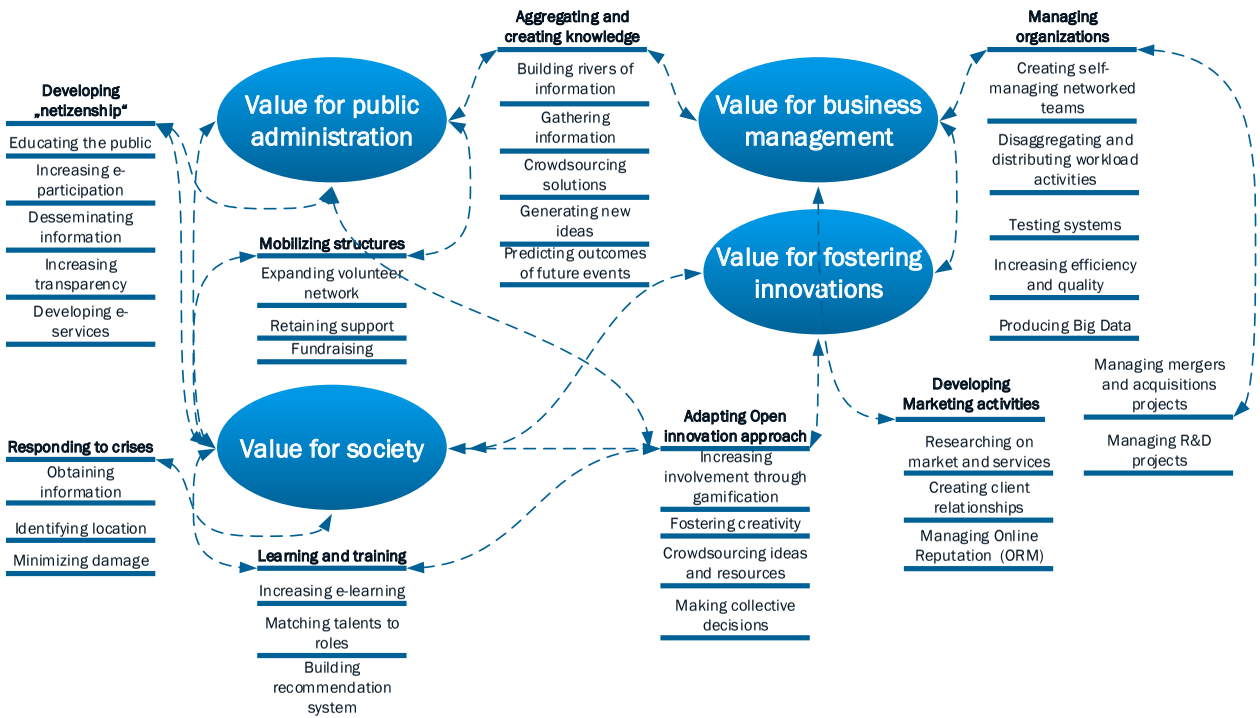
Collective Intelligence may obtain various shapes and patterns, e.g., citizens that work together towards achieving a common social goal

beneficial for community or political parties to run campaigns and to select candidates, as well as business enterprises collaborating or competing towards finding the innovative solution to a problem (Lykourentzou et al., 2011). As already mentioned, CI is the general ability of a group to perform a wide variety of tasks and activities. This behavior, which Preece and Shneiderman (2009) called Technology-Mediated Social Participation, "shows the ability of masses to achieve common goals through participation and collaboration on Web – goals that no single individual or organization could achieve alone" (Woolley et al., 2010; Leimester, 2010). The main challenge is to understand how and where to employ countless amounts of knowledge or experience of the whole networked society or just one organizational network, or virtually communicating community. Through extensive analysis of scientific literature, we can define following areas of community/society or business activities where emergence of collective intelligence could create additional social value (see Table 2).

The first comment about Table 2 is related to the activity that is usually associated with Collective Intelligence: creativity and new idea generation. Emergence of systems which mobilize large numbers of people to engage in creative tasks fostered interest in the social aspects of creativity (Yu et al., 2012). Lesser et al. (2012) state that discovering and sharing new ideas enables creation of value using the experiences and insights of numbers of people globally, identification of new opportunities to differentiate organization or serve new markets, and development of new product ideas, service offerings, cost savings, business/public process or model innovations. Yu et al. (2012) identify two dimensions in defining collective creativity that collective activities vary on – the nature of the task and the nature of the output of the collective activity. Some outputs of creative activities are collections of individual work, i.e., *aggregated output*. Other activities produce novel results, i.e., *emergent outputs*. Yu et al. (2012) determine two ways in which this can emerge: (1) through discovery, when crowd participants can find something not seen before, and (2) through combination, when integration participant's work can produce something novel.

Table 2. The potential of Collective Intelligence for creating social and economic value



Source: developed by the authors

Following types of collective creativity, systems could be presented as follows:

- Community members can provide their ideas or products of creativity in a form of *collection creation* (e.g., Flickr), when items contributed by members of the crowd are created independently of each other (Malone et al., 2010).
- The crowd in *games* can perform high demanding complex tasks and the output of the games is the solution to difficult scientific problems. The results show that for difficult problems, the players' solutions can in some cases outperform computational methods (Khatib et al., 2011). There are also games designed to facilitate scientific discovery, e.g., online game Foldit was developed to help generate candidate protein folding structures. According to Prpic et al. (2014), firms can possibly benefit from games when innovating, too.
- *Online contests,* e.g., idea competitions, are used for evoking collective creativity (Yu et al., 2012). Challenges are posted on platforms and the crowd competes with each other for the prizes (in most cases – financial motivation) by providing solutions. Contests are very useful for defined open-ended problems and, therefore, a popular way for innovation (Wang, 2014).
- Another way of generating ideas is *virtual ideation and dialogue* processes, where individuals come together online to discuss and share insights on specific topics (Lesser et al., 2012). Communities of practice are example of employment of this approach. Such communities provide a platform for people with similar interests, hobbies or profession to share and develop their knowledge. These kinds of collaborative platforms enable social networking, fostering open dialogues and facilitate virtual communication between community members (Lesser et al., 2012).
- *Collaborative creation* of something (Malone et al., 2010) or *collaborative design markets* approach (Lesser et al., 2012), when creative individuals giving the voice in some entity design (creation) process, deals with idea generation activity and helps to create new products. Proper example of this kind of collaborative Collective Intelligence application is any open source software (e.g., Linux) or open innovation projects (e.g.,

Procter Gamble), where strong interdependencies among the modules or proposals submitted by different contributors could be observed. *Collaborative communities,* embodied by open source software communities, provide access to a large number of diverse contributors and allow rich collaboration (Wang, 2014).

- *Virtual Labor Marketplace* is an IT-mediated market for spot labor, where individuals and organizations can agree to execute work in exchange for monetary compensation. This type of crowdsourcing is typified by endeavors like Amazon's M-Turk and Crowdflower. The crowd of workers at these web properties are generally thought to excel at micro tasks, such as the translation of documents, labelling photos and participating in surveys (Prpic, 2014). Labor markets can be used for human computation and potentially innovative work (Wang, 2014).
- *Crowdsourcing* is another field, where organizations try to solve their problems by an open call in the network which often possesses unique knowledge, offering them conditions to express that knowledge (Silva and Ramos, 2011). *Crowd creation, voting, crowd funding and other forms of crowdsourcing* could be outsourced by organizations for creating open innovations: aggregating knowledge, insights, making better, more informed decisions about the future, etc.
- *Complementors,* such as app developers, provide innovations that complement firm's products (Prpic, 2014).

Investigation of literature related to innovation management leads to a conclusion that there exist multiple of approaches, definitions and frameworks explaining emergence of innovative activities based on exploring CI. Despite a close link between innovation and scientific and technological dimensions, a large consensus exists that innovation is a complex process that cannot be reduced to the technological side (Pereira et al., 2010). In general, the literature suggests the following variables underlying successful innovation (Goyal and Akhilesh, 2007): integration of talents; interdependence of roles; task complexity; interdepartmental collaboration; communication structures; diversity of knowledge, talents, etc. The long term task of CI systems is closely related to this concept of innovation: "to fuse the knowledge, experience and expertise of individuals, in order to elevate, through machine facilitation, the optimal

information and decisions that will lead to the benefit of the whole community" (Kapetanios, 2008).

Product innovation is considered a typical application of collective innovation by Wang (2014). Customers could be engaged via diverse collaborative mechanisms, according to Sawhney et al. (2005), which could be divided in two groups according to stages of product development: front-end (ideation, concept development) and back-end (product design, product testing and production introduction tools). Ideation, concept development stages of product development require high richness in interaction and include tools, such as suggestion box, advisory panels, virtual communities and web-based idea markets. Broader audiences could be involved by using online surveys, market intelligence services and web-based conjoint analysis. Social technologies allow customers to be intensely involved in later stages of product innovation, too, e.g., there are toolkits allowing customers to design circuits and games (Wang, 2014). Open source mechanisms empower group collaboration when developing products, too, i.e., web-based prototyping, virtual product testing and virtual market testing. Product design, product testing and production introduction tools include mass customization of the product, web-based prototyping, virtual product testing and virtual market testing.

In the R&D and innovation projects, quality of solutions and consistency of the output should be ensured. Access to talent, diversity of participants and participant engagement recruiting new members from surrounding learning communities over time precondition project's quality and consistency of the output (Bonabeau, 2009). Approach of CI systems could be adopted as a means for solving long-standing scientific problems (Savage, 2012). The findings of several critical and extensive empirical studies suggest considerable benefits of collective decision-making using social networking technologies to R&D project teams, and project teams (Cohen and Prusak, 2001; Cross and Parker, 2004). In 2010, research conducted by Hulpia and Devos determined a positive relation between team members' participation in collective decision-making processes and their organizational commitment. In general, employing CI developing tools in *project management* could improve the quality of project output results (Gloor et al., 2008; Goyal and Akhilesh, 2007) by:

– Reducing communications failures among project members by converting on-way communication into two-ways communication;

- Discovering core contributors in virtual communication and collaboration and unlocking the creative potential of team members;
- Assisting in finding good ideas in the project and the whole organization context through visualization of knowledge;
- Distributing work in new and innovative ways, in targeting and motivating the right participants, etc.

In mergers and acquisitions projects, getting knowledge from different companies involved in the process to design new high-performing teams can be demanding (Gloor et al., 2008). Employing collective and collaborative approach of communication among new members of the group not only helps to improve companies re-design process, but also ads/increases value for enterprise. Creating new solutions as collaborative teams, consisting from members with different background and contributing with knowledge, helps to aggregate and incorporate knowledge in re-designed community.

Experience, insights and expertise of individuals worldwide could be used in creation of new ideas and innovations. Applying social technology tools in the market research and customer service enables to reach wide population and to receive lots of different information: customer stories, complains, recommendations, preferences, experiences, etc. Lykourentzou et al. (2011, p.218) focus "on the issue of enhancing the in-house knowledge of an organization by using expert peer matching techniques to harness the collective intelligence of the employees". As Gloor et al. (2008) argues, Collective Intelligence approaches could improve efficiency and productivity of sales and marketing. In the market research, analysis of activity in social networks serves as a guidance for productive and non-productive members of the sales and marketing force (Gloor et al., 2008). There is some research done showing that high performing sales force members communicate more with external people than average or low performers; at the same time, they use more communication technologies for their work (Gloor et al., 2008; Bulkley and van Alstyne, 2004). On the other hand, data show that there is no correlation between performance and overall volume of communication, which implies that other more complex metrics, e.g., contribution level, should be used for indicating employees' performance.

In the case of market research, it is important "to maintain ability to discover or elicit true responses, which can be obtained by sample

size control (whether it is representative of market) and participants engagement" (Bonabeau, 2009). Customer service improvement can be developed in users' community environment. The percentage of problems solved, early discovery of problems can detect effectiveness of activity. Key indicators of communication quality can be responsiveness to unsolved problems and participants' engagement (Bonabeau, 2009). As Boder (2006) states, CI systems are a keystone in *organizational knowledge* generation. Main actions involved in order to maintain high performing organization knowledge system are the following ones: making individuals' competence explicit, clear articulation of objectives, smooth mechanics of interaction, complementing various competencies, ensuring reciprocal expectations, and trust and respect enhancing interactions and organization norms should be developed. Patel (2009) proposed recommendation system based on the principles of collective wisdom. A distinctive feature of the proposed system is that it also accounts the overall opinion of the user community, as well as common occurrence patterns observed in the user behavior. Beyond the development of existing ideas and providing solution to existing ideas and solving contemporary issues, Collective Intelligence can be applied to predict the outcomes of future events (e.g., Microsoft project completion date prediction) (Malone et al., 2010). It facilitates making better, more informed predictions about the future, generation of potential solutions, predicting outcomes of today's increasingly complex business challenges and improving forecasting effectiveness (Bonabeau, 2009; Lesser et al., 2012). For improving forecasting effectiveness, traditional forecasting approaches, such as *prediction markets,* can be employed (Malone et al., 2010; Lesser et al., 2012). In prediction markets, participants with virtual currency or tokens invest or divest in the likelihood of future events or outcomes. Numbers of virtual market "prices" or tokens are interpreted as forecast probabilities. Contest approach may also be applied by introducing reward system based on the accuracy of the predictions compared to other participants and actual outcomes.

The intelligence community is using the techniques of Big Data analysis to search for patterns in vast flows of communication to predict social unrest in countries and regions of particular interest. Some new businesses are now using similar techniques to analyze millions of messages in order to predict costumer behavior. "The digital commons

is a vast and growing universe of engineering inventions, software, and digital media content, created by people who have chosen to share their creations freely, because the material barriers to and costs of organizing have dropped dramatically" (Al Gore, 2013).

More fields where CI approach is useful to employ could be revealed by more extensive literature review and practical case analysis. Fields, such as system testing or requirements engineering (Lykourentzou et al., 2011), or other more specific areas can use innovative ideas emerged from CI systems in order to increase process efficiency. For example, CI approach application in system testing could aim to assess number, quality and scope of unexpected issues that are uncovered during the testing. Liang et al. (2010) suggest that "notions from collective intelligence could also be useful on the field of requirements engineering" and propose methodology focusing on pre-requirements analysis for large and complex systems through three stages, i.e., collaborative tagging, ontology development and finally collective decision-making. Klososky (2011) identifies 4 CI tools that are essential for modern organizations: building rivers of information (ability to aggregate and filter information so that it can be funneled into human brain); the organizational voice that creates a conversation with constituents; crowdsourcing and Online Reputation Management (ORM). Regardless of the size or type of business, an online reputation is forming. Every time the company or products names are mentioned, these comments become searchable and any prospective customer will find these comments.

Another activity where Collective Intelligence can be developed in order to use it is decision-making or deciding. For years, chiefly in the business organizations, specially arranged teams or focus groups executed these tasks. Now, by adopting virtual network, it is possible to use a wide group of individuals to execute these processes. Decision support requires a great amount of information processing and the evaluation of potential solutions (Bonabeau, 2009; Leismester, 2010), so the decision support tasks can be divided into generating alternative solutions (this activity is closely related to idea generation) and evaluating them. Malone et al. (2010) distinguish two types of decision-making: (1) group decisions, and (2) individual decisions (Table 3). Ways of decision-making (group or individual) determine what environment, technologies and processes are involved.

Table 3. Collective Intelligence developing tools for decision-making

Type of decision	Tool for decision-making
Group decisions	Voting; Consensus; Averaging or rating.
Individual decisions	Purchasing or demanding; Social networking; Communities of practice.

Source: adapted from Malone et al. (2010)

Group decisions. One of the approaches to make group decision is voting. Usually, website users or anybody from the community participating in the voting give their vote for their preferred alternative and the one determined by the majority vote is treated as a wining solution. Malone et al. (2010) separate two sub-variations of voting used in some virtual communities implicit voting[15], e.g., iStockPhoto and weighted voting[16], e.g., Google Search.

Another way of decision-making in technology-mediated groups is consensus (e.g., Wikipedia). It means that all group members agree on the final decision. In this case, solution cannot be accepted if anybody disagrees or votes against it. The kind of consensus is used in the human-based character recognition system reCAPTCHA[17]. The system proposes for users to enter a correctly scanned word, which is unrecognizable by optical character recognition software. Only when the word is typed in the same way by a required amount of users, the word is treated as correctly spelled (more on the topic, see von Ahn et al., 2008).

Malone et al. (2010) discuss averaging or rating as the manner to make decisions. By averaging, the authors mean cases where decisions involve picking a number. Averaging is commonly used in the systems where quality is evaluated by some point scales (e.g., Amazon, Booking.

[15] Actions, such as buying or viewing items, are counted as implicit "voting" (Malone et al., 2010).

[16] Ranking, e.g. search results on the basis of how many other sites link to the sites in the list (Malone et al., 2010).

[17] CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) is a widely spread security measure in the World Wide Web that prevents automated programs from abusing online services. They do so by asking humans to perform a task that computers cannot yet perform, such as deciphering distorted characters (von Ahn et al., 2008).

com). The average quality rating of all rated users is shown next to the alternative as the final decision (e.g., NASA Clickworkers, Marcetocracy).

Individual decision. While decisions do not need to be identical for all and there is no requirement/task to evaluate an entity in one adopted rating system, individual decisions are applicable. One of the ways to use individual decisions in the collective preference detection is purchasing or demanding control (e.g., eBay). In this case, all individuals make a decision to purchase from some kind of demand, which affects availability and price level.

Earlier in the idea generation part, discussed approaches that use individual decision in the virtual environment are social networking (e.g., blogosphere) and communities of practice. They can be equally adopted in the decision-making activity. Relationship and linking based on trust, similarity in tastes and viewpoint, other common characteristics form structure of the social network or interlinked web with related content (e.g., Epinions.com), which can recommend, consult, provide alternatives and propose solutions.

Lesser et al. (2012) discuss decision-making by means of disaggregating and distributing workload activities. These activities can be performed individually or in groups. In order to improve decision-making by augmenting skills and distributing workload, these approaches can be used:

- Parallel task processing, when complex problems are deconstructed into smaller or simpler tasks;
- Distributed questions and answers, where members answer each other's questions in order to solve the problem;
- Online simulated serious games enabling participants to apply their real-life knowledge and problem solving skills to provide solutions to complex problems.

A collective intelligence application is one that aggregates the knowledge and work of its users to provide the data for the application and to improve its usefulness (Gregg, 2010). Aggregation refers to mechanisms for pooling and processing individual estimations to a collective estimation. While simple averaging might be the most common method of aggregation, it is not always the most suitable one. The rise of the Internet has made it possible to develop new aggregation methods, such as information aggregation or prediction markets (Bothos, et al, 2009), social tagging or folksonomies (Gruber, 2007; Zettsu and Kiyoki, 2006)

and data visualization (Chen, 2007). In scientific publication, the Open Science movement aims to disperse authority and expand collaboration (Lin, 2012). Scholars have been attracted to these novel patterns of innovation and production and the use of "open source" as a scholarly term has been growing dramatically (Prpic et al., 2014).

Most discussed examples of collective intelligence applications are labelled as Web 2.0 applications. Web 2.0 is an abstract term used to define computing paradigm which uses Web as application platform allowing user collaboration and sharing, e.g., wikis, blogs (or Weblogs), social network services, and social bookmarking (Gregg, 2010). According to O'Leary (2008, p.36), "wikis satisfy four key knowledge management needs by capturing knowledge from those who have it, converting knowledge into an explicitly available format, connecting those who want knowledge with those who have it and linking knowledge to knowledge". In wikis, important aspects that facilitate instrument efficiency are the following ones: mass collaboration, transparency and pull versus push mechanism. Such applications make tacit, hidden content from large groups of people explicit and widely available (O'Leary, 2008).

Creation of collective intelligence systems fosters learning. IT systems can promote social learning, in which human participants learn from the output of others and "the computers can also automate the learning routines using human performance as input to machine learning techniques, in the end freeing up humans to address more and more complex cognitive tasks" (Yu et al., 2012, p.6). Such e-learning system promotes the growth of human and computer capabilities by generating creative solutions to social and scientific problems (Wang, 2014). Properly constructed collective creativity environments can help build valuable expertise for participants. Product design by facilitating crowds provides few challenges, i.e., multiple claims for ownership, complicated commissioning of participants, etc., but both organizations and especially participants always have opportunities to learn and grow intellectually by using the crowdsourcing model. Rheingold (1996) emphasizes that online communities accommodate large numbers of professionals who share their expertise and make such platforms a potentially practical tool. According to Costa (2006, p.3), "when the need arises for a specific piece of information, a specialized opinion or the location of a resource, the virtual communities work as a genuine living encyclopedia. They can help

their members deal with the overload of information. Virtual communities then would end up working as truly intelligent human filters".

A new form of citizenship in the Internet is called "netizenship". Recent years have seen an increase in democratic innovations (Smith, 2009) aimed at increasing the participation of the public in policy-making. This observation, coupled with the increasing prevalence of internet-based communication, points to a very real possibility of implementing participatory democracies on a mass-scale in which every individual is invited to contribute their ideas and opinions (Salganik and Levy, 2012). Some governments providing services to individuals are making dramatic improvements in their ability to communicate important information on the Internet and engage in genuinely productive two-way communication with citizens. E-democracy and e-participation tools could raise citizens' participation in government decision-making (Carrizales, 2008). One important question in implementing participatory democracies experiments of this type, according to Goel et al. (2014), "is the aggregation problem: given a large number of ideas, how can one identify the top ideas without requiring any individual, whether an appointed government expert or a participant, to spend too much time or effort in the evaluation process?" A natural approach to aggregation in the democratic setting is to use voting rules, also known as social choice functions (Brandt et al., 2012) to find the top ideas. Estonia has experimented with the Internet voting in elections and referenda. In Latvia, two laws have already been passed as a result of proposals placed by citizens on a government website open to suggestions from the public. Any idea attaining the support of 10.000 people or more goes directly into a legislative process. In addition, many cities are using computerized statistics and sophisticated visual displays to more accurately target the use of resources and achieve higher levels of quality in the services they deliver (Gore, 2013). Some activists promoting Internet-based forms of democracy have proposed imaginative ways to use open source programming to link citizens together in productive dialogues and arguments about issues and legislation (MacKinnon, 2012). On the other side, some corporations and governmental agencies are now developing "dark nets", closed networks that are not connected to the Internet – as a last resort for protecting confidential highly valuable information. Some Internet companies have adopted a "walled garden" approach that separates some of this information from the rest of the Internet (Gore, 2013).

Democracy in the age of the Internet is threatened by manipulation and abuse of networks and platforms that citizens have come to depend upon. According to MacKinnon (2012, p.80), "Internet is a politically contested space, featuring new and unstable power relationships among governments, citizens, and companies […] Internet platforms and services, made commonplace by companies such as Apple, Google, Facebook, and Twitter, along with a range of mobile, networking, and telecommunications services, have empowered citizens, but all governments, from dictatorships to democracies, are learning quickly how to use technology to defend their interests".

Collective intelligence can influence process via democracy tools by strengthening e-participation (as e-forum, webcasting or podcasting, e-mail innovations) or can have an effect even on the final decision (e-consultations and e-surveys, e-petitions). For example, "the Obama campaign's online presence, through Facebook and Twitter, raised awareness that such portals were more than just a private amusement and communication tool they offered interactive, opinion forming and "open" access. In short, they offered real time connectivity between the electorate and their representatives' (Wise et al., 2012). The rapid growth of Facebook, "from 100 million active users in 2008 to over 1 billion active users in early 2014" (Facebook, 2014), has correlate with the speedy adoption of web apps in public ventures. "Web media now have a central role in the US Government's Open Government Directive with nearly all initiatives having an online presence" (Ding et al., 2010). Viable success of profit motivated online collaborative ventures (e.g., InnoCentive, VenCorps, Threadless), governmental organizations to engage the public and several public sector initiatives (e.g., Open.gov, Peer 2 Patent, innovation. ED.gov, Liquid democracy), all appeared as a consequence of that. These platforms foster emergence of Collective Intelligence by engaging a broader community in co-formation of public policies (Wise et al., 2012). The term "Cyberocracy" popularized by Ronfeldt (1992) alludes to a future, where information technology would facilitate government and a cybercratic nexus-state would replace the longstanding nation state. This theory's optimistic forecast and gloomy warnings is more a treatise on political organization than a framework for CI (Wise et al., 2012).

In relationship to fundraising using social media tools, the slactivism tendency should be explained. Slacktivism (sometimes called slactivism

or slackervism) is blended from two words – *slacker* and *activism*. The word describes acts of social media users in support of a social cause that have little or no practical effect other than to make the person doing it take satisfaction from the feeling they have contributed, e.g., "signing Internet petitions, joining a community organization without contributing to the organization's efforts, copying and pasting of social network statuses or messages or altering one's personal data or avatar on social network services" (Morphy, 2013). "Liking" on Facebook, for example, is thought to be an act of good will, as a way to build an audience, show support of a movement and reach more people through engagement. A survey conducted by YouGov found out that many people consider acts in social media (e.g., liking, sharing) as a sufficient way to support an organization. A survey conducted by Morphy (2013) revealed "that one in seven people think that liking an organization on Facebook is as good as donating money". Slacktivism critics say that it is not a real action, social media could be a good first step to get involved, but it cannot stop there. UNICEF Sweden launched an advertisement criticizing Facebook slacktivism and calling for greater monetary support, but research done by Kanter (2014) shows that "there is a positive relationship between the level of social media use and propensity to go from social to donation". Research results suggest that the more Facebook is used (e.g., more status updates, frequent likes), the more likely a user will make socially inspired donation (Kanter, 2014).

Some people in the science community have argued that "unleashing the power of technology mediated social participation" (of which Web 2.0 technologies are early harbingers) may be the only way to tackle societal challenges (Shneiderman, 2009). Such applications could be particularly useful in crisis or emergency response domain. Application of CI in crisis response activity could aim to access to difficult-to-obtain information and minimize damage inflicted by crisis. Vivacqua and Borges (2010) examined emergency responses powered using online participation tools and suggested that "harnessing public CI through crowdsourcing could solve a major problem in the aforementioned domain, related to the prompter identification of the location where the disaster has occurred". Furtado et al. (2010) focused on "the potential of collective intelligence on a different field, that of law enforcement" and proposed WikiCrimes – a collaborative application for registration and investigation of criminal events.

Some people in the scientific community (e.g., Shneiderman, 2009; Vivacqua and Borges, 2010; Furtado et al., 2010) argue that social participation using Web 2.0 and other modern technologies may be the only way to solve some of the biggest problems confronting the population (e.g., health care).

2.2.1. Harvesting Collective Intelligence: When Disaster is on Twitter before Rescuers Arrive

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The blistering speed and spread of information on social media, with more than 1.9 billion users worldwide, potentially offer emergency response agencies an unprecedented wealth of situational awareness when life and property is under threat. In fact, the micro-blog Twitter can warn of an earthquake faster than the physical effects are felt. Social media platforms offer a myriad of benefits before, during and after a disaster. These include warnings, connecting to survivors, situational awareness of the extent of the impact, notifying where help is needed and galvanizing self-help within the impact zone and humanitarian efforts from outside. A unique aspect of social media is that it is user-generated. Twitter has become a tool to foster the emergence of Collective Intelligence, where individuals collaborate to share information, ideas and suggest ways to solve problems. Collective Intelligence comes to the rescue quickly during the chaos of a disaster, when outside help may be hours or days away. On the flipside, however, harvesting Collective Intelligence by disaster agencies to inform time-critical decision-making has become a significant challenge amid the avalanche of social media "chatter" – some of it inaccurate, self-serving, misleading and fabricated. Indeed, social media places significant pressure on the management of timely, accurate and relevant information by disaster agencies. In the topic that has received sparse scholarly attention, this chapter draws on a series of in-depth interviews with emergency and disaster agencies in four countries

to shed new perspectives on the challenges of capturing and capitalising on Collective Intelligence in times of calamity.

This chapter draws on data from interviews with emergency and disaster agencies in Norway, Germany, the United Kingdom and Australia between 2010 and 2014. Interview subjects were selected on a deliberative basis, rather than random sampling (Hampe, 1997; Wimmer, 2006). For example, interview subjects were identified with the assistance of the German Federal Government and the Australian-based Emergency Media and Public Affairs organization, which consists of disaster communication specialists. In the UK, interviewees were selected on the basis of their standing with disaster response and warning organisations. The interviews were based on opened-ended conversational style discussions (Denzin and Lincoln, 1994), using questions devised by the authors, both of whom were able to draw on their experience in disaster and crisis communication and previous research into this field. The interviewees could choose to have their names attached to the interview or be de-identified. The interviews were conducted over a period of between 30 minutes and two hours. The recorded interviews were transcribed and coded to identify key themes. Inductive coding (Joffe and Yardley, 2003) was adopted to allow a more considered and nuanced approach to coding the data without limiting the emergence of new codes. Firstly, the chapter explores the use of social media by the public in disasters and the emergence of Collective Intelligence. Secondly, it examines the challenges of social media for disaster agencies, and thirdly, the perspectives of disaster agencies in harvesting and capitalizing on Collective Intelligence during a calamity are presented.

The emerging phenomenon of Collective Intelligence across social media platforms will have a significant impact on saving life and property in a disaster. Emergency agencies are yet to find ways of effectively harvesting Collective Intelligence to inform their time-critical decision-making processes. Social media continues to be problematic for disaster agencies due to the speed and spread of information and the resources needed to verify information. The study is limited by the size of the sample. The authors argue that the seniority and experience of the participants within their respective organizations add weight to the validity of the data and findings. This chapter brings to light initial perspectives on Collective Intelligence in disasters and builds on the expanding broad-body of scholarly research on disaster communication. Timely, accurate, relevant

and credible information is critical in a disaster when life and property is under threat. Although the study finds that disaster organizations appreciate the value of Collective Intelligence emerging from social media platforms, such as the micro-blog Twitter, there remain hurdles to capturing that data. This four-country study shares perspectives on those challenges and provides a step toward a greater international understanding of the risks and benefits of social media in a calamity. This study explores the topic that has received little attention from scholars and contributes to an overall expanding body of literature on disaster communication issues and challenges. The findings of this chapter have international significance and are universally pragmatic.

Social media has become an increasingly valuable and trusted lifeline of information and support for people facing and recovering from a disaster. For example, the micro-blog Twitter was more effective in circulating information in the areas devastated by the 2011 Japan earthquake and tsunami than traditional media (Kaigo, 2012), which the American Red Cross (2012) contends is the primary source of information in a disaster. Social media "chatter", much of it rapidly re-circulated, spikes significantly immediately after a disaster. In the day following the tsunami, more than 2000 tweets were posted every second (Meier, 2013). As Kaigo (2012, p. 26) explains, "during the Great East Japan earthquake, traditional media and websites could not provide information about lifeline disruption or other necessary information for the vast majority of victims in disrupted areas". Japanese authorities now plan to incorporate social media networks into the country's emergency call system (Dugan, 2012). The speed of Twitter may be useful as a warning system in large-scale events (Crooks et al., 2013). This may become life-saving in a sudden disaster, such as an earthquake, where Tweets and re-tweets from the epicenter reach distant locations before the physical effects. As Perry et al. (2012, p. 6) found out in the 2011 Virginia earthquake, Tweets were read in New York 30 seconds before it was felt there, "showing that information moves faster through networks than the earthquakes themselves". Given the spread, speed and public adoption of social media in times of disaster, this chapter explores how the emergence of Collective Intelligence could benefit the situational awareness, and decision-making process, of responding agencies. The key research questions posed in agencies in the UK, Norway, Germany and Australia, were the following ones:

- How has Collective Intelligence emerging from social media platforms aided self-help in a disaster?
- What are the implications of this for timely, accurate and relevant communication in a disaster between the impacted public, traditional media and emergency agencies?
- What are the barriers to harvesting the Collective Intelligence of disaster victims by emergency agencies to inform time critical decision-making?

In the next section of this chapter, attention is focused on the small, but useful body of literature on the issue of Collective Intelligence in disasters.

Collective intelligence and social media. Social media platforms have become fertile ground for the emergence of Collective Intelligence. Schoder et al. (2013, p. 5) contend that Collective Intelligence "is traditionally understood as the intelligence emerging from the interaction between interconnected people, communicating individuals". For Starbird (2012), Collective Intelligence has been fostered by social media to allow "connected and collaborating human beings to engage in collective problem-solving activities". Debate, however, ensues over whether Collective Intelligence – the sharing of information, knowledge and ideas – emerges from competing or collaborative individuals (Schoder et al., 2013, p. 5). Surowiecki (2005, cited in Starbird, 2012) notes that the "wisdom of crowds" can potentially solve three types of problems: cognition, coordination and cooperation. The impact of Collective Intelligence across social media platforms is far-reaching. For example, the Pew Internet and American Life Project in a 2006 survey showed that for almost 20 percent of US adults – around 60 million people – the internet had played a "crucial or important" role in dealing with at least one major life decision (Boase et al., 2006). Of those, 17 million people had used online access to help another person with a major medical condition. Boase et al. explain:

> "People draw on their network capital – whether it is people in their social networks, people they know in various professions, or those they meet in the course of more formal professional, hobby, or social groups – to try to address issues that arise in their lives. The internet and other information and communication technologies help in this process" (2006, p. 34).

During a disaster, social media platforms delivered across mobile technology allow people reach out to their "online" communities (Dutta-

Bergman, 2006), in tandem with their physical world. This online convergence, when official information may be limited, builds and strengthens community resilience through "people power" (Duffy, 2012). A bank of social capital is developed by the exchange of information during difficult times to build relationships between people (Kaigo, 2012). Therefore, social media in disaster impact areas is frequently driven, and often quickly, by the community wanting to share knowledge as a form of empowerment towards recovery. Scholars point to a myriad of reasons why people turn to social media during a disaster. These reasons include self-mobilisation, seeking and offering emotional support, information-seeking and sharing, searching for missing relatives and friends, to mourn, to exploit the situation for their own purposes and, increasingly, to share photographs and video to document what has happened (Palen, 2008; Liu et al., 2008; Dabner, 2010; Faustino et al., 2012). In relation to Collective Intelligence, Fraustino et al. contend that social media galvanizes people to "self mobilise" and observe that "during disasters, the public may use social media to organize emergency relief and on-going assistance efforts from both near and afar" (2012, p. 17). The 2007 California wildfires provide a useful example of the emergence of Collective Intelligence. Palen (2008) found out that people actively distributed information with other social media participants:

> "Some people came to serve as "information brokers" in the event using various media and sources to disseminate information. They distributed information about road closures, fire line encroachments, shelter openings and closings; they annotated maps; and they created and participated in community web-based forums. Some had experience with fires or insider knowledge through personal networks and connections to government personnel; others were local residents who established e-mail lists and contributed to discussion groups. In this disaster, community forums were increasingly seen as reliable, authoritative sources of information" (2008, p. 78).

This outreach of self-generated help supports a wealth of scholarly research that finds that the majority of people are resilient in the face of disaster (Sederer, 2012; Shultz et al., 2011; Quarantelli, 2008) and help each other (Vieweg et al., 2008). As noted by the 2004 World Disasters Report, in the wake of a disaster, "most lives are saved by the courage and resourcefulness of friends and neighbours. During slow-onset crises such

as drought, some rural societies have developed extraordinary capacities to cope and bounce back". The report continues:

> "People continually adapt to crisis, coming up with creative solutions. They prioritize livelihoods and household assets rather than the quick fix. Supporting resilience means more than delivering relief or mitigating individual hazards. Local knowledge, skills, determination, livelihoods, cooperation, access to resources and representation are all vital factors enabling people to bounce back from disaster" (2004, p. 9).

The US-based Centers for Disease Control and Prevention (2012) observe that the public engages with social media on a greater scale in the hours after a disaster than official agencies. A study by Williams et al. (2012) on community-based social media following a series of tornados in the United States found out that post-disaster social media was generated and driven by citizens rather than emergency agencies. In most cases, community-managed social media, drawing on the collective intelligence of those impacted by the disaster, was the primary source of reliable and relevant information. For example, a University of Missouri Extension Facebook site – Branson Tornado Info – attracted 14,000 followers within 12 hours of a tornado in February 2012. One victim posted:

> "For the first few days after the storm, this Facebook page was our main source of information. Volunteers here answered our questions about where to go to get help, what resources were available and what we needed to do next" (Williams et al., 2012, p. 18).

For Taylor et al. (2012, p. 25), social media's two-way interaction following a disaster also serves as a platform to provide a form of "psychological first aid", where people "reported feeling a sense of connectedness and usefulness, felt supported by others and felt encouraged by the help and support being given to people". For example, following the 2011 Christchurch, New Zealand, earthquake, Dabner (2011) observed that online discussion provided support and information, with one participant describing it as a lifeline "that helped her (and therefore her children) cope with aftershocks by realizing normally (sic) would eventually return" (2011, p. 10). Social media assumed the role of the city's devastated Churches, with one researcher observing the following:

> "Social media was really a way for people to feel like they weren't being forgotten or like they were part of a larger community. As far as someone sitting at home alone at 10pm, they were not able to go out

for a cuppa. That's where social media really kicked in" (Chapman-Smith, 2012).

The small but growing body of research into Collective Intelligence and disasters points to the potential for emergency management authorities to harvest and act on Collective Intelligence data. This chapter now turns to a more nuanced understanding of the barriers to the use of this type of information for emergency organizations.

Social media and disaster agencies. Although disaster agencies today use social media to educate communities and disseminate information, they have been historically reluctant to engage with social media data in their incident command decision-making systems. The reasons include fears about misinformation (Vieweg et al., 2008; Williams et al., 2012), the speed and spread of the information that makes validation difficult (Gowing, 2009), a lack of understanding about how they can make use of social media (Duffy, 2012; Palen, 2008) and difficulties how they might incorporate it into their time-critical decision-making processes (Tapia et al., 2013). As Tapia et al. (2013, p. 770) explain:

> "While data quality continues to be a barrier, what is far more important to organizational use is the serving of this data at the appropriate time, in the appropriate form to the appropriate person and the appropriate level of confidence".

Williams et al. (2012), however, observe a shift from reluctance about harvesting social media data to now championing the benefits because "social media is going to be used in disaster recovery with or without these agencies so officials might as well join the party and make sure the information is more accurate" (Williams et al., 2012, p. 30). For example, the US Federal Emergency Management Agency (FEMA) has committed to engaging with Twitter in all stages of a disaster (Kamm, 2011). The FEMA established a Facebook page for victims of Hurricane Isaac to "relay their experiences" (DiBlasio, 2012). During and after Hurricane Isaac in Louisiana in 2012, the FEMA posted 100 tweets, such as "Phone lines may be congested during/after #Isaac. Let loved ones know you're OK by sending a text or updating your social networks" (DiBlasio, 2012).

Although there have been some in-roads into engaging with social media, researchers point to the need for emergency managers to better understand, and make better use of, social media in all phases of disaster management – mitigation, preparation, response and recovery (Duffy,

2012; Palen, 2008). This is particularly important, given the considerable jump in severity and complexities of disasters since the 1950s (De Smet, Lagadec and Leysen, 2012) and will require a change in thinking and approach. As De Smet, Lagadec and Leyson (2012, p. 146) argue:

> "Modern disasters are becoming increasingly more complex to manage [with the] probability that more and more disasters will evolve into disasters out of the box and necessitating an in-depth revision of the existing disaster management policies and approaches".

Response agencies who fail to engage effectively with social media risk "losing the ability to influence the public's decision-making in emergency situations" (NGIS, 2009, p. 17). Indeed, Lindsay (2011) argues that disaster agencies could utilise social media as a platform for disaster victims to seek help, as in the case of the Japan earthquake and tsunami, and to provide greater situational awareness. Lindsay continues:

> "Social media could be used to alert emergency managers and officials to certain situations by monitoring the flow of information from different sources during an incident. Monitoring information flows could help establish "situational awareness". Situational awareness is the ability to identify, process, and comprehend critical elements of an incident or situation" (Lindsay, 2011, p. 4).

Aside from situational awareness, another benefit of social media engagement is the ability for disaster responders to counter rumours and misinformation that spread quickly in the wake of a disaster. For example, Bruns et al. (2012) observed that Twitter was used effectively for this purpose by the Queensland Police Service, Australia, during the 2011/12 South-East Queensland floods. Additionally, "@QPSMedia also played a crucial role in enabling affected locals and more distant onlookers to begin the difficult process of making sense and coming to terms with these events, even while they were still unfolding" (Bruns et al., 2012, p. 8). Although the Queensland Police Service is an example of effective engagement with social media during a disaster, this chapter now explores the perspectives of disaster agencies elsewhere in Australia, the UK, Germany and Norway.

Harvesting collective intelligence – the perspective of disaster agencies. The interviewees for this study agreed that social media offered benefits, risks and challenges for disaster agencies. For example, the Principal Civil Protection Officer for the Essex County Council, UK, Rosanna Briggs acknowledges the role of social media, and that of the

public, in disaster management and situational awareness. She explains as follows:

> "The social networks are out there and working incredibly quickly within minutes of anything happening. And you know, particularly if they are in that area, they've got all the data that we as response agencies need. The public has the part to play in any emergency, actually understanding what some of that data and information that they've got could really help the public generally, so they should be sharing it with us. So we, again, should be much more in tune with that, to be able to respond to that" (Interview, 2010).

Despite the speed and reach of social media, Nicholas Hefner, Head of Public Relations, Federal Agency for Technical Relief (THW), Germany, observes that some agencies still default to the traditional method of communication by using media releases. He argues that those organisations had not made a priority of social media and, therefore, were unable to engage effectively with it. He explains:

> "We haven't learned yet in Germany to actually say, "Okay. We need to, first comes social media because it's quicker, and when we have done the social media we do our traditional communication stuff, the more, the long term communication." So we still stick with […] a press release first, and after the press release we do the rest […] and this is a bit difficult because it doesn't work anymore" (Interview, 2013).

A key theme to emerge from the interviews is the velocity of the information spread on social media platforms – what the authors of this paper call the New York Earthquake Effect. This challenge is compounded by the expectations of social media contributors, whom Fraustino et al. (2012) found expect disaster agencies to monitor social media and respond quickly – the majority within an hour – to their posts. This expectation, however, poses significant challenges for emergency agencies. For example, Kjell Braatas[1], of the Norwegian disaster agency DSB, contends that responding agencies may not be resourced to deal with social media posts – particularly those calling for help, as was the case for the New York Fire Department during Hurricane Sandy in 2012. Testing social media engagement during a simulated disaster exercise proved a steep learning curve for Norway's DSB, as Braatas explains:

> "And we also see that at least during some exercises we've had lately, we've seen that where we have also exercised social media,

which has been working, it's been very, very, a learning experience. And we've seen that, we think it will also happen in the real world, that there will be lots of questions asked on Twitter for example about where should I go and how many are dead and things like that. And we have seen, at least during these exercises that nobody answers them, because I think nobody feels that it's their job to answer on social media. But then it also gets very in the limelight kind of that no one is answering these questions, and that can become a crisis in itself" (Interview, 2013).

A second key theme to emerge from the participants is the need to verify information on social media before it is confirmed as factual by the disaster agencies. This, they argue, places significant pressure to respond in real time as events unfold. For Hefner, of Germany's THW, this task is almost impossible despite media and public expectations. The main challenge is the ability of agencies to sort relevant and timely facts from opinion and speculation. Hefner explains as follows:

"This is a big problem that everyone wants to communicate about an issue, even if there's so many people who just put their opinion on Facebook and on Twitter and everywhere. It's very difficult to divide the good from the bad" (Interview, 2013).

In Australia, the pressure on emergency agencies to confirm information on social media, particularly Twitter, has led to tension with traditional media. For example, Media Manager for the Victorian State Emergency Services Lachlan Quick points to competing priorities when journalists call asking for details not yet verified. He explains:

"Well I have heard there is a man trapped in a pipe and you guys are not telling me anything," or I've heard, "That there are flood waters rising here and you guys are not telling me anything." Whereas what we are trying to do is gather as much information from as many sources as we possibly can, get that into something that's digestible" (Quick, 2011).

Jessica Adamson, Channel 7 Sydney reporter, contends that social media has "turned the tables" on information in a disaster. She explains:

"It's frustrating because we've always come to expect over the years that the emergency services are going to have all the information, and they will have it first. And we would be happy to wait for them to give us everything that they knew, because they knew more than us.

> Now the tables have turned, and the community, and sometimes the journalists, because sometimes we'd beat the emergency crews to the story, we know more than them, often. So no, it's not a case of reporting everything that you hear from social media or that you see on YouTube, you definitely need to verify it with emergency managers. And again if you have that trust, then you'd hope that they would be able to respond quickly and efficiently and accurately" (Interview, 2011).

Adamson explains the process of interaction between the media and disaster officials:

> "We often are putting situations to them and saying, "Look, we've heard this, can you get back to me really quickly, I need to verify if this is right or not." To begin with, they can be quite annoyed by that. They don't, some emergency managers don't like to be told things. They want to be telling you the news, and so it can put them off, and so you need to be able to do it delicately and sensitively, pragmatically. But in the end, if you want to be able to say that you've heard it from official sources, then it has to come from them" (Interview, 2011).

Neil Stanbury, Director, Media and Public Affairs, Western Australian Police, contends that traditional media outlets will source information from social media to "cover every new development of an incident" (Interview, 2011). He argues that because social media information is often not validated, the media and the authorities will need to be involved in a high degree of information sharing. The time pressure posed by social media is also a challenge for the police in Norway, where Facebook is the country's largest media and "bigger than the national television channel" (Farbrot, 2014). Commissioner Ole Bredrup Saeverud, of the Tromso Police District, has observed a significant change in providing information to the public and traditional media. Saeverud explains:

> "Ten years ago, we didn't tell the media or the public about the incident before we had the whole picture. But now we have to inform them the minute we know about it. And then, with the little information we have, and then update it on a regular basis" (Interview, 2013).

To meet the real-time pressure of social media, police may need to inform relatives of a situation involving a death before the identity is officially confirmed, but it is likely to be correct. Saeverud contends that this is an effort to inform relatives, and provide support, before they discover it on social media. He explains:

> "We cannot wait for confirmation of identity before we inform. We have to inform on suspicion. That's a risk, but it's better than nothing. Because they wait or they come to us, and then we have to handle it and well we might as well do it as quick as we can. Because, in most cases, we have an idea who it is. It's the car, it's probably the owner of the car and so forth. So takes quite a short time to find out who it's supposedly is. It takes some time before you can confirm it. In Norway, the amount of people using social media is enormous; it's one of the largest in the world" (Interview, 2013).

In the UK, disaster agencies contend that the real-time social media pressure extends to the political level. Ian Cameron, Advisor to the UK National Steering Committee for Warning and Informing the Public, argues that many politicians build a strong social media following on platforms, such as Twitter and Facebook, and with it comes an expectation of an instant response to questions, as experienced by disaster agencies. This is problematic in an unfolding disaster, where factual information is limited and the pressure may force the politician to speculate. Cameron explains:

> "Some of these MPs will have, you know, a few thousand constituents following them and journalists know they'll be followed and so immediately if there's a disaster in a certain area, you will start following those MPs yourself on Twitter. And you can ask questions of them as well and you can see what questions the public are asking. But what you find is that politician, instead of saying I'll go and get the answer, it tends to be a knee-jerk reaction" (Interview, 2014).

Despite these challenges, Hefner, of Germany's THW, argues that social media has changed disaster communication for the better. It has created higher levels of transparency in the relationship between disaster agencies and the public by placing more onus on agencies not to conceal or withhold information because the public "will know it anyway" (Interview, 2013). He asserts that social media has changed the way disaster agencies deal with communication because it is "much easier to communicate because you can say, "Yes. It's true," or you can say, "Well, let me have a look. I have to prove what's going on". He continues as follows:

> "You have to be honest to the public and so communication and calamity has become much more honest and the old people have difficulties with it because they want to be the information managers who have the information and who distribute the information like in [the] military. This doesn't work anymore" (Interview, 2013).

Despite the avalanche of social media chatter in a disaster, Gerrit Mows, Head of the Warning Unit, German Federal Office of Civil Protection and Disaster Assistance (BBK), contends that people will still turn to official agency websites that provide the "big picture" on an unfolding disaster rather than pieces of information on social media, such as Twitter. Therefore, for Mows, social media offers "one picture, but the official site can give us 10 pictures. They have the overview" (Interview, 2013). The advantage of providing a wider view of the disaster outweighs the time it takes to verify information. Mows continues as follows:

> "We cannot get the information in everything on social media, we just point it, and say, "Okay. Go to this site, where we have the big picture. If the big picture is not there, wait a few minutes, we will enter [it]"". (Interview, 2013).

Social media is now an indelible facet of communication before, during and after disasters for those affected by a disaster and for those observing it from a distance. This chapter concludes with a consideration of the benefits and difficulties social media presents for emergency management authorities in relation to how they need to engage with the prospects of interactivity in the social media space in the future.

Conclusion. This chapter argues that Collective Intelligence in the context of a calamity is about the need for people collaborating via social media to self-help during and after a disaster to save life and property and return quickly to normalcy. Although disaster officials agree that there are risks and benefits of social media, they are not resourced to harvest the emerging phenomenon of Collective Intelligence. Firstly, it is problematic for agencies to verify information due to the speed and spread of social media. This challenge is compounded by the avalanche of "chatter" that swamps social media sites, making it difficult to filter facts from speculation. In turn, this is a source of tension between the agencies and traditional media, who want official confirmation. Secondly, agencies are not resourced to meet the expectations of social media participants for a response to questions or requests for information. Thirdly, as Collective Intelligence strengthens, emergency agencies may lose influence over community decision-making, such as preparation, warnings and evacuations. As disasters become more severe and complex, this chapter argues that Collective Intelligence will have more impact on saving life and property. The reality is that people in a disaster have no alternative but to work together.

2.2.2. Entrepreneurial University in the Context of Collective Intelligence

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In the 21st century, the role of the university essentially changes when, in order to achieve the set ambitious goals, the necessity to seek for entrepreneurship is stressed. According to Mian (2003), during the last two decades, universities have performed a significant role in the creation of the Knowledge Society both in developed and developing countries. Universities are strongly affected by the constantly changing environment and they also affect the environment in their own turn; therefore, the agenda for modernization of higher education states that higher education institutions do not use the potential to the fullest and they should ensure the tendency of growth in the perspective, not only strengthen the societal role (by contributing to the economic growth of the state, region and the whole Europe). Universities are faced with the need for the dynamic strategy, which corresponds to market and ensures the integration of other external factors for the adaptation of universities" major activities, in order to improve the quality of scientific research and to attract best students and teaching staff for ensuring financial diversification. Having all this in mind, researchers search for unique solutions that would condition a smoother process of universities" transformation and assist in implementing "the third mission" of universities in the integration of the needs of all concerned. Researchers focusing on the entrepreneurial university agree that university's transformation towards the entrepreneurial university and the creation/self-development of the entrepreneurial university is a long-term bottom-up process and they point to regional, national differences. Looking from this perspective, the conceptualisation of the entrepreneurial university, as suggested by Farsi et al. (2012), who take into consideration local (national) and contextual aspects in developing countries, should be mentioned. Having compared higher education institutions in Western and post-Soviet countries, Mets et al. (2014) distinguished the naturally occurring differences in the transformational process of universities, which stem from historical, cultural and economic aspects. Lithuania is not an exception. Following 2014–2020 National Progress Programme, Strategy "Lithuania 2030",

Lithuanian higher education institutions are orienting themselves towards the common objectives set on the European Union level, and, thus, Lithuanian universities are firstly faced with the necessity for quicker changes in order to lessen the existing gap in these aspects:

- **Cooperation between industry and research (entrepreneurship in general).** According to the scorecard data provided in the EC Report on the Innovation Union progress at country level, Lithuania noticeably lags behind other European states, as seen in the indicators for cooperation between industry and research (entrepreneurship in general). Chan and Lo (2007) maintain that "Competition has become a normal and widely accepted phenomenon among universities in the entire world"; however, when the existing national differences and the aspect of differing acceleration rates in university's transformation into an entrepreneurial university (Vorley and Nelles, 2008) are taken into consideration, then it seems natural that an ambitious objective to overcome the national lag as regards the championing entrepreneurial universities (firstly in Europe) is set for Lithuanian universities that have long been indirect participants in the process of economic development (López, 2013).
- **Attracting students.** One of the factors determining national inter-university competition is the number of students that, due to both the emigration rate (the highest in Europe net annual emigration) and the demographic situation in the country, has been annually decreasing since 2009.

Another significant factor is the low attractiveness of Lithuanian higher education; for instance, in 2011, the share of foreign students in Lithuanian higher education institutions made only 1.9 percent of all students.

- **University autonomy.** The Law on Research and Higher Education, adopted in 1991, after the Restoration of Independence, newly established the principle of autonomy and academic freedom of higher education institutions; thus, it is not surprising that the 2011 research into autonomy carried out by European universities found out that Lithuania, as regards autonomy, is not the leading country in comparison to other European higher education systems (see Table 4).

Table 4. Autonomy of Lithuanian universities in the context of the autonomy research carried out by European universities

Autonomy field	Rank of 28	Lithuania's non-weighted average	Maximum non-weighted average (%)	Minimum non-weighted average (%)
Organisational autonomy scores	11	75 %	Great Britain 100 %	Luxemburg 31 %
Financial autonomy	19	51 %	Luxemburg 91 %	Cyprus 23 %
Staffing autonomy	10	83 %	Estonia 100 %	Greece 14 %
Academic autonomy	26	42 %	Ireland 100 %	France 37 %

The lack of autonomy in Lithuania's higher education institutions has been identified by foreign experts as a weakness due to not only too strong state regulation, lack of flexibility, but also the noticeable negative influence by politicians, big number of institutions governing higher education system and lack of competence of their staff[18]. University autonomy in Lithuania was and is a change that had and still has to be adapted in newly forming the role of a university and changing the understanding of a university in a transitional period.

– **Financial diversification**. The decreased state funding of universities, according to Dan (2012), was one of the major reasons determining the development of cooperation with business enterprises. Noticeably, in Lithuania, the transformation of state functions in higher education's transition from control to monitoring was not a natural process in understanding changing social reality and seeking to correspond to the growing needs, as, for example, in the case of the USA. The viewpoint that higher education, including the aspects of quality, accessibility, maintenance, belongs to the governmental responsibilities slows down the financial diversification process.

Considering the need for rapid changes in universities and seeking to contribute to search for unique solutions, in this chapter, the author firstly

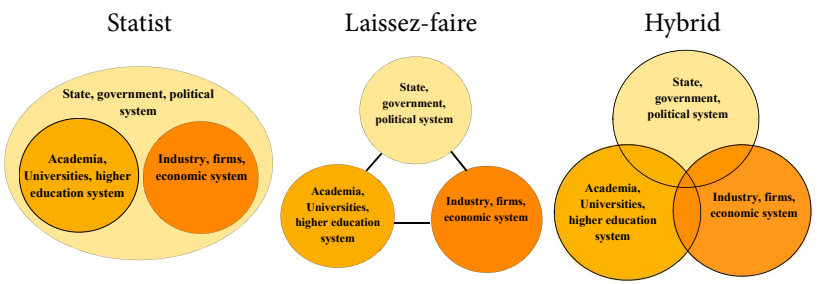
[18] *A Complex Analysis of Changes in Lithuanian Higher Education Policy in 2009-2011*. Vilnius: Research and Higher Education Monitoring and Analysis Centre, 2014.

carries out the analysis of research literature by highlighting the importance of universities" "third mission" for the transition of the hybrid Triple Helix model towards the Quadruple Helix model; the author of this article also analyses the importance of Collective Intelligence in the formation process of the entrepreneurial university implementing "the third mission".

The change of universities' mission in the interaction of changing innovation systems. University transformation is first and foremost related with the change of university mission in historical development. The first, and for a long time the main, mission of universities was growing realms of knowledge but not the progress of knowledge per se. In Etzkowitz et al. (2000), the first academic revolution is defined as the paradigmatic changes that occurred in the 19th century when, alongside teaching, the second mission – that of science and research – was distinguished. The second academic revolution is related to the identification of "the third university mission" – the need to contribute to the social and economic development of both a region and a country (Etzkowitz, 2003). In research literature, an established understanding of "the third mission" of universities is not provided. "The third mission of universities" is seen as a practical application of universities" scientific research results, accumulation, use and dispersal of new knowledge – participation through interaction in the solution of the problems that are considered important by the society. In Campbell and Carayannis" (2013) viewpoint, an example of the universities' third mission is creation of innovations. According to Montesinos et al. (2008), "the third mission of universities" implies services to society which comprise social responsibility, entrepreneurship and innovation. The author of this article also maintains, following Tim Vorley and Jen Nelles (2008), that "the third university mission" not only unites both former missions of a university (teaching and scientific research), but also contributes to positive changes in teaching and scientific research through activities pertaining to "the third mission", i.e., determines changes in university governance systems where there is greater orientation towards practical needs of society, transfer and commercialisation of studies and scientific research results, social responsibility and competitiveness. The former university missions – those of teaching, studies, knowledge creation and development – change since universities aim at preparing students who would be able to create new knowledge and knowing and would successfully apply their ideas in

labour market. The second – scientific research – mission is an inseparable part of higher education, which is measured not only by research publications; commercialisation of research and start-ups are acquiring bigger importance. It is namely the effort to contribute to social and economic development of a region/country that distinguishes the mission of the entrepreneurial university from traditional university (Farsi et al., 2012). Acoording to Secundo et al. (2014), the entrepreneurial university is directly related to the implementation of "the third mission", i.e., this is an obligatory condition for the implementation of "the third mission". Etzkowitz et al. (2000) regard the entrepreneurial university as a result of the revolution of the university's mission, i.e., universities, especially the entrepreneurial ones, according to these authors, are important actors in the development of the Triple Helix model for innovation. The evolution process of the model of the Triple Helix (University-Industry-Government), as formulated by Etzkowitz and Leydesdorff[19], is divided into three major configurations: statist, different interactions (or laissez-faire) and hybrid. It is worthwhile stressing that often, mistakenly, the Triple Helix term is applied and perceived essentially as its hybrid Triple Helix configuration by eliminating the statist and different interactions (laissez-faire) configurations of the Triple Helix. Contrary to the statist stage, which is dominated by one of the elements (the State or Industry or University), in the laissez-faire stage, mutual relations start forming that overlap only in the course of the hybrid stage (see Figure 3).

Configurations of the model of the Triple Helix



[19] The conception of the Triple Helix was initiated by Etzkowitz (1993), Etzkowitz and Leydesdorff (1995).

The Quadruple Helix model

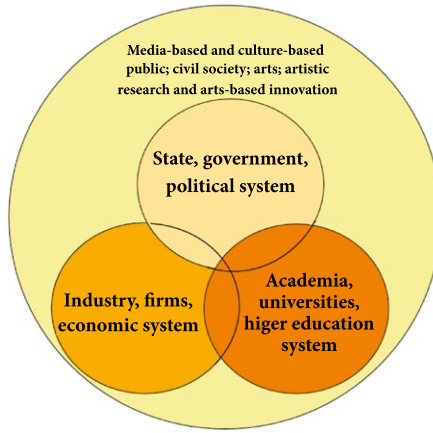


Figure 3. Innovation systems

Sources: Chlivickas (2009); Etzkowitz, Gulbrandsen and Levitt (2000); Carayannis and Campbell (2010, 2014)

The hybrid Triple Helix model is identified by pursuit because, when the elements of the Triple Helix function in different spaces, their synergy is a complex task. It should be stressed that the research into innovation systems is intensely developed by academia. The model of the Quadruple Helix supplements the Triple Helix model with the fourth element – the society[20] (see Figure 3). According to Carayannis and Campbell (2014), the necessary condition for the Quadruple Helix is democracy since the model is first and foremost oriented towards a human being and only then towards institution. The authors maintain that the fourth element of the Helix comprises media- and culture-based society, civil society, arts, artistic activities and art-based innovation. Artistic activity opens up interdisciplinary and multi-disciplinary configurations and knowledge creation networks based on scientific research. Meanwhile, art-based innovations encourage creativity in the creation of knowledge and

[20] Carayannis, E. G., and Campbell, D. F. J. Developed Democracies versus Emerging Autocracies: Arts, Democracy, and Innovation in Quadruple Helix Innovation Systems. *Journal of Innovation and Entrepreneurship. A Springer Open Journal*. 2014, 3: 12 [interactive]. [accessed on 2014-11-15]. <http://www.innovation-entrepreneurship.com/content/pdf/s13731-014-0012-2.pdf>.

innovation. The Quintuple Helix is to be considered to be an extension of the Quadruple Helix, which, according to Carayannis and Cambell (2012), creates a win-win situation through the synergy of ecology, knowledge and innovation, economy, society and democracy. Following the ideas of the development of innovation model proposed by Carayannis and Cambell (2012), the author of this chapter refers to the model of the Triple Helix by highlighting the position that the Triple Helix model configuration in Lithuanian has not yet become hybrid; however, the necessity is stressed for a greater involvement of society in a transitional period. For the Triple Helix model and its elements, the inner (existing inside every element) and outer (found among elements of the Triple Helix) communication and exchange of knowledge are regarded as the essential component; and the role of entrepreneurial university, as the necessary condition for the third mission, is defined as one of the major roles in creation and development of the triple communication in the process of innovation creation (Brundin et al., 2008). Considering the fact that most appropriate models of developing economic competitiveness are being sought for both on the national and the EU scale, entrepreneurial university is acquiring a significant role in innovation development due to its broad field of applying the created scientific knowledge.

The importance of Collective Intelligence for the formation of entrepreneurial university. The controversial concept and understanding of what an entrepreneurial university is in research literature are variously defined; however, the performed analysis of the understanding of the entrepreneurial university allows concluding that, despite constant change and complexity of the entrepreneurial university (emerging new elements and their interaction), some common features can be distinguished. The researchers investigating the entrepreneurial university agree that the university's transformation towards the entrepreneurial university and creation/self-development of the entrepreneurial university are long-term bottom-up processes in which national aspects/differences determine both the sequence of development and composition/typology. The complexity of the concept of the entrepreneurial university is also to be considered a characteristic element of the entrepreneurial university since the entrepreneurial university functioning in a complex environment demands differentiated decisions: as Clark (2004) puts it, "One hundred universities require one hundred solutions". One of

the originators of the research into the entrepreneurial university is considered to be an American sociologist Burton R. Clark, whose book "Creating Entrepreneurial Universities: Organizational Pathways of Transformation" published in 1998 is still referred to by researchers of the entrepreneurial university. Five elements described by the author that determine successful institutional transformation of the entrepreneurial university are the following:

1. **Strengthened steering core** that is capable of decentralising and (or) centralising control, i.e., influencing the lessening of bureaucracy and growth of university's flexibility through ability to mobilise resources quickly and innovatively.
2. **An expanded developmental periphery**. In the entrepreneurial university, there are no doubts as regards the enduring continuation of academic traditions; however, the necessity is stressed to create interdisciplinary networks and connections with the exterior through service centres and other departments for the inclusion of those interested in the activities and fostering of cooperation.
3. **Diversified funding base** that ensures autonomy and determines flexibility and a quicker implementation of the third mission in order to attract funding in various ways.
4. **Stimulated academic heartland.** Transformation of the entrepreneurial university firstly begins and occurs in the academic community, the ensuring of support of which is regarded to be one of the most complex challenges. As Gjerding et al. (2006) notice, this process is more complicated in the universities representing social sciences and humanities in comparison to the technological sciences.
5. **Integrated entrepreneurial culture.** Successful entrepreneurial universities, as the author believes, form entrepreneurial university's culture at all levels since, if entrepreneurship is considered an inseparable part of work, changes are more quickly accepted and the level of entrepreneurial culture in the university essentially determines further success and development of the university.

The distinguished five elements of the entrepreneurial university have laid foundations for research into the entrepreneurial university; however, as it has already been mentioned, there is no established conception of the entrepreneurial university in research literature and, thus, fragmentation is

observed. Parallel to the term of the entrepreneurial university, in research literature, other terms and concepts used to describe the entrepreneurial university can be come across, for example:

- Innovative University (Clark, 1998; Van Vught, 1999; Kirby, 2002);
- Market University characterised by academic capitalism (Slaughter and Leslie, 1997);
- Entrepreneurial organization that adopts entrepreneurial governance style, the members of which act in an entrepreneurial manner and interact with the environment (Ropke, 1998);
- Corporate University, which engages in useful activities and practices, including commercialisation of teaching and scientific research (Aronowitz, 2000);
- University Technological Transfer, i.e., technology transfer function is also attributed to the university (Dill, 1995);
- Natural Incubator, which offers possibilities for teaching staff and students jointly create and develop new, intellectual, commercial and joint initiatives, assisting in fostering the abilities that will be necessary after graduation and finding a place in labour market (Etzkowitz, 2003);
- A social system where inner divisions, such as research centres and faculties, try to correspond to market needs and adapt to changing environment by acting innovatively (Blenker et al., 2004);
- A dynamic system composed of special efforts, processes and results. In order to achieve an objective, the entrepreneurial university mobilises all resources, abilities and potential to implement "the third mission" (Salamzadeh et al., 2011).
- A system of collective intelligence (Secundo et al., 2014).

Within the framework of this article, having summarised the conceptions of the entrepreneurial university developed in research literature, the author of this article considers the university's mission – the pursuit of contribution to social and economic development of a country/region – as a characteristic feature of the entrepreneurial university (Farsi et al., 2012). The entrepreneurial university is treated as a condition necessary for the result and implementation of the third mission of universities; the significance of collective intelligence is highlighted as a component part of the process of the formation of the entrepreneurial university and the source of the potential of the entrepreneurial university

in the implementation of "the third mission". Despite the above mentioned national and unique differences pertaining to a certain university, it is universally agreed that the entrepreneurial culture is important for the transformation of a university and the necessity for collective thinking and actions is stressed. One of the essential elements of the entrepreneurial university is joining efforts/self-rallying of all interested parties in the creation of new organisational vision (Gjerding et al., 2006). As noted by Skaržauskienė et al. (2013), the potential of Collective Intelligence can be used to enhance community productivity through more effective (due to the help of Collective Intelligence) solution of societal problems. The authors in their paper "Following Traces of Collective Intelligence in Social Networks: Case of Lithuania" review research literature and list the diverse aspects and components of Collective Intelligence suggested by researchers; one of these is collaboration of university and industry. Secundo et al. (2014) develop the idea further and identify the entrepreneurial university as a system of Collective Intelligence where material resources and intellectual capital are employed to implement "the third mission". The concept of Collective Intelligence defined as group intelligence that forms during collaboration and solution of particular problems is not new; however, starting with 1990, the interest in the thematic of Collective Intelligence initiated quick evolution and formalisation (Lévy, 1994; Pór, 1995; Malone et al., 2008; Secundo et al., 2014). In their paper, Boulesnane and Bouzidi (2013) review research literature and distinguish various conceptions of Collective Intelligence:

- Collective Intelligence as a group ability to solve more problems that a single individual would not be able to do on his/her own (Heylighen, 1999);
- Collective Intelligence as an important factor in the process of decision-making based on collaboration and information exchange among different actors (Gregg and Dawn, 2009, 2010);
- Collective Intelligence as a smart use of information by a group of people for a solution of a problem (Malone, 2008).

Secundo et al. (2014) in their conceptual model stress that if the concept of Collective Intelligence, aligned with the management of intellectual capital, were used, not only a more rapid transformation of universities, but also the quality improvement process in higher education systems would occur more quickly. Following four blocks of essential questions provided

by Malone et al. (2010) (What is being done? Who does things? How are things done? Why are things done?), the authors suggest a general viewpoint of management of intellectual capital that leads to the main objective of the entrepreneurial university, "the collective human capital" (Secundo et al., 2014). The importance of Collective Intelligence should be stressed in:

– Firstly, the inner network of the entrepreneurial universities (by connecting all interested in the university for the implementation of "the third mission"),
– Secondly, the implementation of "the third mission" in the transformation of the Triple Helix towards the model of the Quadruple Helix.

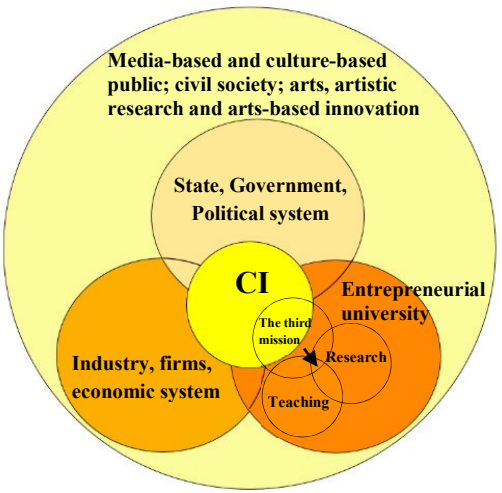


Figure 4. The importance of Collective Intelligence for the formation of the entrepreneurial university

Source: developed by the author following Metz (2010), Metz et al. (2014), Secundo et al. (2014)

Following research literature review:

- The importance of Collective Intelligence for the formation of the entrepreneurial university in the transformation process of the university has been stressed since it is more probable that, by employing Collective Intelligence and rallying those interested, the set tasks would be more effectively implemented

(implementation of "the third mission"), the emerging problems solved, the development of innovation systems accelerated: all this is possible to achieve not by acting separately, but rather by sharing knowledge and by cooperating.

- A framework has been drawn (see Figure 4), identifying the need for research into Collective Intelligence:

1. In the process of the formation of the entrepreneurial university;
2. For the implementation of the third mission of universities and the encouraging of innovation both in the inner network of the entrepreneurial university, where it is necessary to engage all interested parties, and the model of the hybrid Triple Helix (State-Industry-University);
3. In the transformation of the hybrid Triple Helix model into the Quadruple Helix, following Carayannis and Campbell (2014), when the importance of the fourth element of the Quadruple Helix – the engagement of the society – is growing.

Conclusions. The performed analysis of the research literature allows concluding that there is no established conception of "the third mission"; however, despite the existing differences, it is universally agreed that "the third mission" is changing university's participation in the economic development process. "The third mission of universities" is aimed at contributing to social and economic development of both the region and the country.

It has been determined that the entrepreneurial university, an important actor in the Triple Helix, is not only directly related to the implementation of "the third mission", but also is a necessary condition itself for the implementation of "the third mission". In the course of the transformation of the traditional university into the model of the entrepreneurial university, where dynamic collaboration with society and industry is necessary, the major feature that characterises the entrepreneurial university is "the third mission", for the implementation of which various means and methods can be employed.

On the base of the reviewed research literature, a framework identifying the prominence of Collective Intelligence in the formation process of the entrepreneurial university for the implementation of the third mission of universities has been developed.

2.3. Managing Complexity: Transforming Systems Thinking into Collective Intelligence

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"The art and science of management has gone through many phases. In really creating success and taking a path that leads to outperformance, we suggest looking into smartly managing complexity – proactively, before it overwhelms and performance deteriorates!" (Blockley, 2010). Thus, the circumstances in which most businesses today find themselves are dynamic and uncertain and the dominant organization priorities that were emerging as a result of the global economy are cost reduction, developing of new technologies, emergence of networked and virtual organization, etc. These conditions require flexibility, collaboration, innovation and the courage to embrace uncertainty and ambiguity. It is not surprising that recent literature has suggested that "new ways of thinking" are required to manage the complexity (Ossimitz, 2000; Laszlo, 2002; Gharajedaghi, 2006; Makridakis, 2009). In this chapter, a perspective within management research is suggested that has an analytical focus on comparison of Collective Intelligence to other expressions of intelligence. The "intelligence" is a widely discussed concept to describe various social entities (Goleman, 2008), but the discussions in management science are generally focused on the emotional and social intelligence at team and organization levels. This chapter demonstrates the potential of integration of systems thinking and Collective Intelligence approaches when managing complexity by developing theoretical framework of the relationships between these two phenomena. The first part of the chapter explains the systems thinking concept and the value of system thinking for organization management. The second section extends the multiple intelligences approaches (including emotional, social and system intelligence) to the next level in the effort to develop a more comprehensive, pragmatically relevant, theoretical model for managing complexity.

2.3.1. Intelligence Competencies for Managing Complexity

The dynamics of complexity and diversity enhance demands on leadership competencies at all organizational levels. What are the intelligence competencies, which leaders require, in the global context? "In the global

context, technical expertise, factual knowledge and customer or shareholder orientation seem to gain much less attention than the "soft" qualities such as systems thinking, pattern recognition, networking, flexibility etc." (Jokinen, 2004). In order to answer the leading question, the first component of the term "intelligence competencies"– intelligence itself – is discussed.

If the meaning of intelligence (Latin *Intellectus* – understanding, cognition) is traced, we discover an almost unmanageable number of interpretations from different time periods and subject areas, interpretations which are considerably divergent, sometimes to the point of controversy (Aulinger and Miller, 2014). Wechsler (1896-1981) stated that it is impossible to define intelligence; *it* can be measured by its manifestations. The nature of intelligence is not yet sufficiently investigated but according to the works of Wechsler (1939), Thurstone (1938), Thorndike (1874-1949), Guilford (1897-1988), interpretation of the essence of intelligence is based on the concept of intelligence structure. Some scholars argue that intelligence is strictly hereditary trait, others state that intelligence is related to the speed of perception or response to external stimuli. Individual intelligence is a widely recognized factor in determining the performance of tasks in various fields and is the subject of studies in psychology, neuropsychology and sociology disciplines. As a result, different models explaining human intelligence can be found in literature. Thurstone (1938) identified seven forms of intelligence, calling them primary mental abilities (number facility, word fluency, verbal comprehension, spatial visualization, associative memory, reasoning, perceptual speed). Thurstone (1938) considered that it is sufficient to create a test to investigate each of these forms of intelligence to identify a profile of potential opportunities for each tested person. Unfortunately, further intelligence research has shown that intelligence, as a phenomenon, requires a deeper scientific analysis. Gardner (1983) has gone several steps further than intelligence test creators and distinguished interpersonal intelligence, whereas Guilford (1959) identified as many as 120 intelligence characteristics. Sternberg's (1985) theory of intelligence defines intelligence "as a mental activity that is directed specifically to adapt the individual's life to the real world". Sternberg and Grigorenko (2006) argue that intelligence cannot be understood without the cultural context.

In this chapter, only a small selection of definitions of intelligence is listed:

– Intelligence is what intelligence tests measure (Boring, 1923);

- Intelligence is "the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment" (Wechsler, 1958);
- The term intelligence is understood to mean adaptive behaviour as a means of conserving life or, more specifically, the species (Cruse et al., 1999);
- Intelligence is a human, or people's ability to create information content when it is missing, provide and formulate a new solution (Kvedaravičius, 2006);
- Intelligence is a "biophysical potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (Gardner, 2002);
- Intelligence relieves human beings of the pressure to physically adapt to the environment and instead enables them to adapt the environment to their own needs (Müller, 2009);
- Intelligence is the degree of a living thing's ability to overcome challenges through the processing of information (Aulinger and Miller, 2014).

In 1994, 52 scientists generated a common definition of intelligence in The Wall Street Journal: "Intelligence is a general mental ability, which includes the ability to plan, look for reasons, solve problems, think abstractly, learn quickly and learn from experience, it is not just academic learning from books, it is the perception of the essence of things and understanding how to act in a given situation". The broader intellectual perception of intelligence is associated with a holistic theory of personality. McClelland (1973) linked his theory of personality to unconscious motives, the self-schema and appropriate models of behaviours. Goleman (1998, 2006) integrated social intelligence to the concept and, thus, combined the psychological level with neurological-genetic impulses. This model of personality contains the following dimensions: neurological or genetic level, determining competencies, motivation and needs level, values and philosophical level, level of different competencies and clusters of competencies. Glynn (1996) extended the concept of individual intelligence to organizational intelligence, defining it as "an organization's capability to process, interpret, encode, manipulate and access information in a purposeful, goal-directed manner, so it can increase its adaptive potential in the environment in which it operates".

Different authors and studies (Rosete and Ciarrochi, 2005; Goleman, 1998, 2000; Boyatzis, 2007) tend to include abilities from three clusters of competencies that could cause or predict outstanding leadership performance:

- Emotional intelligence competencies, or intrapersonal abilities, including self-awareness and self-management competencies;
- Social intelligence competencies, or interpersonal abilities, such as networking, including social awareness and relationship management;
- Cognitive or system intelligence competencies, such as pattern recognition, systems thinking.

Many scholars (Kets De Vries, 2001, 2004; Mintzberg, 2001; Rosete and Ciarrochi, 2005) have investigated the relationship between competencies of social and emotional intelligence and leadership. Boyatzis and Goleman (2007) characterized systems thinking as Cognitive Intelligence competency – "an ability to think or analyze information and situations that leads to or causes effective or superior performance". The notion of "systems thinking" became attractive to wider audiences because "it provides a "new way of thinking" to understand and manage complex problems" and offers "a new perspective on how individuals act with a lesser or greater degree of intelligence within physical and social systems" (Bosch et al., 2007; Cabrera et al., 2008). Systems thinking is a very broad field and "it would be impossible to cover all the tools, techniques, methods and approaches in a single document" (Sherwood, 2002). Checkland (1981) described systems thinking as "applied systems thinking, differentiating between hard systems thinking and soft systems thinking". "Hard systems thinking often called systems dynamics or operations analysis is most useful in computer simulations where the problem and factors related to it are well defined" (Dawidowicz, 2011). At the core of system dynamics methodology are the concepts of feedback loops and time delays that characterize the dynamic complexity of a system (Sterman, 2000). In contrast, "soft systems thinking, sometimes called holistic or reflective thinking, is applied to problems where the problem involves conflicting or multiple perspectives that must be reconciled or understood" (Nguyen et al., 2012). As a result, soft systems thinking includes "developing a model and comparing that model to the real-world situation until potential answers are sufficiently honed to support one best answer to the problem" (Dongping, 2010). The idea of "a system

as a bounded set of inter-dependent elements, which as a whole exhibits a number of "emergent" properties" is now used to study and manage complex situations in organizations and society" (Córdoba-Pachón, 2011).

"Systems thinking is not simply an engineering approach; it is a philosophy for solving many practical problems" (Blockley, 2010). It should be noted that the "systems thinking theories are widely spread but they are not universally known and applied in management, since they require a deeper understanding of systems philosophy" (Richmond, 2001). According to Richmond (2001), one of the reasons why it is difficult to apply systems thinking effectively is "that the thinking skills stand in stark contrast to the skill set that most of us currently use when we grapple with business issues". Systems intelligence is a new topic in the scientific literature dealing with such problems. First appearing in publications of Hämäläinen and Saarinen (2004), "systems intelligence has resonated with the related fields of decision making, communication and leadership" (Jones and Corner, 2011). Although drawing on traditional systems thinking, "systems intelligence goes beyond it by positing that people act with systems intelligence even when they do not objectively know about systems" (Ormerod, 2008; Jones and Corner, 2011). Systems intelligence as a theory is "based on the belief that some people have a greater intuitive ability to operate effectively in systems than others and that these people are able to instigate positive systemic change". However, the theory of system intelligence also supports the idea that this kind of intelligence can be improved upon and developed (Hämäläinen and Saarinen, 2004).

According to Batra (2010), "companies successfully implementing system thinking approach, perform better in virtually every business category, including return on scales, and return on investment, employment growth and stock value growth". It has been found that system-thinking methodology is highly beneficial to improve the performance of any organization, but "the future growth of systems education will depend on how well systems researchers around the world can relate systems thinking to topical issues and the complex problems managers and decision-makers are facing today" (Jones et al., 2011). Linking systems approach to the new research topic of Collective Intelligence can open new possibilities for application of systems thinking in organization management.

The subject of research on Collective Intelligence, as well as the field of systems thinking, is multidisciplinary, according to Salminen (2012), as

it is related to psychology (Woodley and Bell, 2011), complexity sciences (Schut, 2010), cognitive studies (Trianni et al., 2011), biology (Bonabeau and Meyer, 2001), computer sciences and semantics (Levy, 2010) and social media (Shimazu and Koike, 2007). However, at the moment, there exists no theory capable of explaining how Collective Intelligence actually works (Schut, 2010). Thus, it is challenging for researchers from different disciplines "to be aware of advancements in other fields, possibly under differently named concepts" (Salminen, 2012).

When linking systems thinking approach to Collective Intelligence, it should be noted that CI differs from individual intelligence due to its social dimension. "Group members may be involved in the collaboration differentially with regard to their abilities and desires, yielding a system with characteristics and capacities unlike those, one group member could display alone" (Goyal and Akhilesh, 2007). While some researchers contend that learning is mostly an individual activity, "most theories of organizational learning stress the importance of collective knowledge or collective intelligence as a source of organizational capability" (Goyal and Akhilesh, 2007). Hence, group intelligence could be defined as the functional intelligence of a group working as a unit (Williams and Sternberg, 1988). At group or collective level, CI as a cognitive ability is a factor underlying creativity and innovation. "Fresh new source of ideas and knowledge may be brought in together with the recruitment of the new members; and this continual flowing-in of new ideas and knowledge is beneficial for knowledge innovation inside the organisation" (Lou et al., 2007). Senge (1990) proposes that "individuals and organizations can enhance their learning capabilities through the application of systems ideas and models to help them visualize limitations and implement opportunities for learning". According to Siemens (2005), "many learners will move into a variety of different, possibly unrelated fields over the course of their lifetime. Learning now occurs in a variety of ways – through communities of practice, personal networks, and through completion of work-related tasks".

The task of this paper is to use the theories of complex adaptive self-organizing systems for explaining how Collective Intelligence emerges from individual interactions (Ottino, 2004). According to Schut (2010), CI "systems are complex by nature and (1) are effectively adaptive in uncertain and unknown environments, (2) can organize themselves autonomously, and (3) exhibit "emergent" behavior". Adaptivity in this context means the ability

of a system or its components to change themselves according to changes in the environment (Schut, 2010). Self-organization means the emergence of order at the system level without central control with emergence defined as "the whole is more than the sum of its parts" (Damper, 2000). Using theoretical insights of Salminen (2012, more about the model in Chapter 2.1), 4 levels in the present model are defined: *micro, macro, emergence* and *complexity level* (see Figure 5). The *micro level* is defined micro as interaction of emotional, social and system intelligence. The model shows that the micro level is influenced by growing complexity. On the other side, the *complexity level* is influenced by a broader use of technologies and global web network. The higher the complexity with its wide range of potential outcomes, the greater the need for different intelligence competencies. At the *macro level*, IT and Web structures influence the formation of "wisdom of crowds" effect (through human-computer interaction). Analysing the suggested 4 level model, one could observe the emergence (*emergence level*) of Collective Intelligence from *micro* and *macro levels* to the *level of complexity*. The rows in the model show that Collective Intelligence is influencing and influenced by the complexity (see rows in Figure 5).

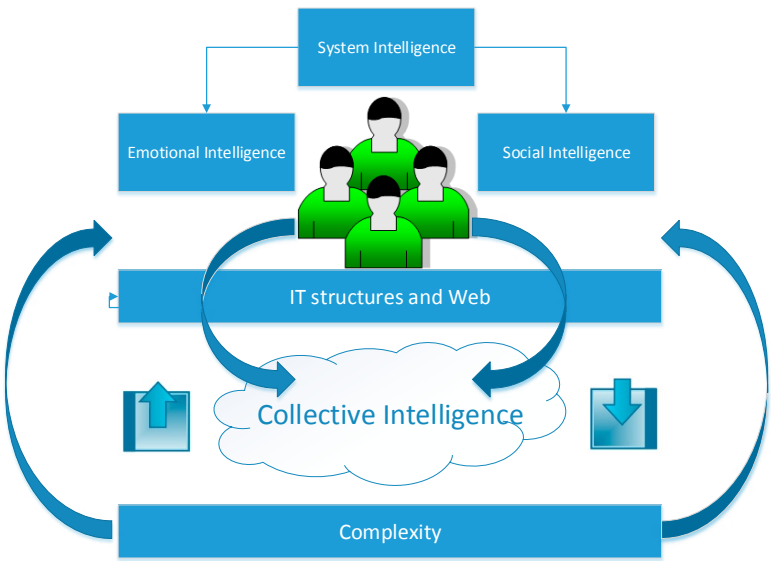

Figure 5. Managing complexity: Interaction between intelligence competencies and Collective Intelligence

Source: developed by the authors

The suggested perspective of system thinking and Collective Intelligence illustrates our understanding of how intelligent activities emerge in social interaction. Groups and organizations develop collective mental models (Senge, 1990) and interpretive schemes, which affect group decision-making and action. Connectivity or connecting (i.e., joining, linking and communicating) is "at the heart of modern complexity theory, leading as it does to the important concept of "emergence"". Collective Intelligence is "reflected in the capacity for information processing, efficiency with which group is able to solve problems, quality and timing of group decision-making" (Goyal and Akhilesh, 2007). These abilities form the foundation for performance in the highly competitive, knowledge-based environment. By applying systems thinking approach and acting on the bases of Collective Intelligence, individuals and organizations could encounter positive changes and sustainably react to complex situations. With the support of social technologies, "the societies and communities may exhibit higher intelligent features than a traditional community does since ICT firstly provides an effective communication channel for massive exchange of data, information and knowledge" (Lou et al., 2007).

Collective Intelligence in organizations could be defined as social capital in a form of unique competitive advantage in a knowledge-based economy because it is difficult to transfer and "is the key source of innovation in products, services and processes" (Haldin-Herrgard, 2000).

2.3.2. Collective Intelligence and Distributed Leadership

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Following the discussion above, it can be assumed that seeking an emergence of Collective Intelligence, an interaction among organizational members and between members and the environment is needed. As indicated in the previous chapter, the ultimate success of knowledge creation, sharing and utilizations depends on "how organizational members relate to each other through the different steps of the process" (Krogh et al., 2000). "In the context of increasing importance of teamwork in all kinds of organizations, the complexity of problems imposed by the environment and a need for continuous innovation, a cognitive viewpoint of groups is imperative" (Goyal

and Akhilesh, 2007). Hence, organizations should make "relationships among their members a priority in setting up and implementing activities that provide relational support" (Zupan and Kaše, 2007). In line with this thought, it needs to be considered that the organization's managers cannot force people to interact and establish relationships but they could create the conditions where those interactions are more likely to emerge (Cohen and Prusak, 2001; Cross and Parker, 2004).

Theoretical and practical leadership studies have expanded vastly as part of knowledge management since the beginning of the 20th century (Crevani et al., 2009). Most theoretical models of organization management since then have given the leadership a central role, e.g., when motivating employees, communicating strategic goals, vision and work principles (Crevani et al., 2009). "The field of leadership studies has traditionally been leader-centered, i.e. focused on the individual leaders and their traits, abilities and actions" (Goyal and Akhilesh, 2007). Research on leader-follower exchanges shows that "leader behavior which provides follower support (in terms of task-relevant direction or emotional relief) leads to enhanced follower motivation and commitment; transformational effects on followers are possible" (Fletcher, 2004). In contemporary organizational science, the researchers shifted their attention from observing the individual to monitoring a network of relationships within organizations, because "knowledge becomes an asset to the organization only when it is accessible and its value increases with the level of accessibility the relationships among organization members" (Davenport and Prusak, 2000). Modern organizations emphasize "the emergence of the relational, collectivist and non-authoritarian nature of leadership practices – opposing against unreflective mainstream perspectives that sustain heroic, individualist and authoritarian leadership norms" (Crevani et al., 2010). In complex situations, management and leadership is preferably a collaborative and collective responsibility "where the responsibilities, competencies and decision-making need to be distributed onto several individuals rather than one" (Collinson, 2007). "Complex sustainability problems tend to transcend the jurisdictions and capacities of any single person, profession or organization to manage" (Blockley, 2010).

Conception of leadership as spread throughout an organization is important but not new; it has been expressed for several years in the form of Collective Intelligence. Conceptualizing leadership "as a role that can be

distributed among individuals within a team depending on the expertise required, is a critical theoretical transition given several important trends in modern organizations" (Crevani et al., 2010). Distributed leadership could be defined as "the distribution of leadership functions among the team, which is a group of people with formal leadership roles" (Hulpia and Devos, 2010). The concept of shared governance in the organization and management naturally aligns with distributed leadership, defined by J.P. Spillane (2007) as "frequently used as a synonym for democratic leadership, shared leadership, collaborative leadership".

Building distributed leadership in knowledge-intensive work demands sophisticated technologies – "learn from and solve problems with other people in organizations using new technologies" (Cross et al., 2001). Integration of ICT could facilitate the creation of network capabilities, such as the ability to locate and share knowledge and respond to changes rapidly. Knowledge held by members of the network of relationships help dynamically to solve problems and create new knowledge. Distributed leadership is information-based and "creating an informational environment helps solve increasingly complex and often ambiguous problems" (Zack and McKenney, 1995). "The distribution of information and knowledge between members in the team or network and the exchange of that information is the foundation from which distributed leadership emerges" (Mumford, 2009). Critical information concerning the problem is required to enter the network and be distributed among appropriate network channels in order to effectively utilize the diverse skills and expertise of participants. "Effective information exchange is a driving force among network members, information is the medium by which the leadership role is shared among a collective" (Mumford, 2009).

Benefits of distributed leadership application in organizational development are confirmed in a number of studies (Mumford, 2009; Hauschildt, 2001; Elmore, 2000; Hulpia and Devos, 2010). Hauschildt (2001) evaluated 133 innovation projects within the engineering industry and the effects on technical and financial success of having multiple leaders, taking on different elements of a leadership role. With the involvement of more leaders in the processes, the gains in performance increased from 30% to 50%. Team member's participation in collective decision-making process and their organizational commitment have a positive relation. According to Hulpia and Devos (2010), the effect of participative decision-making on

organizational commitment varies in significance depending on a variety of conditions: the areas over which members have influence, administrative openness to such influence, normative acceptance of such opportunities, the organization of the participatory process, etc. According to Pirola-Merlo et al. (2002), "open communication, which is defined by a work climate where people feel comfortable sharing ideas and information with other organizational members, strengthens organizational commitment. Climate is a set of shared attitudes or expectations that a team has with regard to a specific context (e.g., climate for creativity, climate for safety) and thus, affective climate refers to a team's creativity". Similarly, Mathieu (1990) claimed "that good communication within the organization enhances the work environment and increases organizational commitment".

The new field for the emergence of distributed leadership is networked (or virtual) teams. Networked teams are organizations which members do not share a common workspace all the time and must, therefore, interact and collaborate using networking, communication and collaboration tools, such as blogs, email, videoconferencing, special networks, etc. According to Mumford (2009), distributed leadership in networks can be compared to the mechanism of message transfer in human neurological system. "Networks are structured like neurons within the brain. These connections are not flat, but rather a 3D, layered system of linkages. Neurons serve specific roles, but there is also emergent meaning when impulses follow certain paths. Similarly, there is meaning in the way information flows through specific patterns of team members" (Mumford, 2009). The case study by Skaržauskienė (2012) explored application of networking technologies for successful development of distributed leadership in public administration organisations. The research results showed that team-based networked organizations require "different kind of leadership from that in positional hierarchies. Such leadership may be more flexible and sophisticated, capable of encompassing ambiguity and rapid change" (Skaržauskienė, 2012). In sum, distributed leadership has significant and beneficial implications for team performance and organizational processes. It creates a more efficient use of expertise and increases the effectiveness of teamwork by distributing elements of the leadership role to those that are best suited to take them on. The research results demonstrated significant team performance improvement in decision-making, commitment and communication, creativity and atmosphere in the team.

The discussed research results encourage organisations to approach leadership as a distributed effort. A team or organization could develop their distributed leadership capabilities using new technologies: building online communities, adapting virtual communication tools and creating networked projects. Flexibility that networked organizations provide could help integrate a culturally diverse and multi-generational workforce (Skaržauskienė, 2012). However, it is very important to note that comprehensive training is critical for developing distributed leadership approach. The training for networked teams should be more interactive than for other types of teams. Apart from learning to work effectively in teams and developing problem solving and decision making skills, employees must also acquire basic management and informatics skills to manage their own processes. The major challenges organizations face in changing from a traditional to high-involvement environment include changing and developing organizational culture. When evolving to distributed leadership, enterprises face multi-stage process of increasing involvement, which could take from two to five years. The processes might be never-ending from a learning and renewal perspective.

2.4. Discussion about Possible Risks Related to Collective Intelligence

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Collective intelligence (CI) in modern world may be considered as an innovative decision-making form. Nowadays, CI may be widely applied and practiced by using social technologies for helping decision-making bodies or other interested people to reach innovative quality resolutions for various problems. Thus, explicit analysis of every social phenomenon cannot be fulfilled without exploration of possible risks determined by its

development. As every other social phenomenon, CI creates not only new possibilities for easier interaction and knowledge sharing, but also fates some threats and problems, which have to be taken into consideration. In regards to this aspect, this chapter presents some theoretical insights into potential risks and legal aspects of Collective Intelligence along with a short overview of the main regulation in this field.

It should be noted that some researches on conceptualising Collective Intelligence have already been published. However, there is no single theory capable to explain how Collective Intelligence works. The authors of this chapter have already suggested conceptualising Collective Intelligence as a knowledge network created by web-mediated (social technologies) interaction amongst individuals with personal knowledge (Skaržauskienė et al., 2013). By using social technologies, individuals can easily share their knowledge and build a new level of Collective Intelligence. There is one aspect of CI, which is named by Bonobeau (2009) as "common" to all forms of Collective Intelligence. It is a loss of control. First of all, it relates to control over outcomes or fulfilled activity. In some cases, undesirable and unwanted outcomes that can be harmful to an organization, community or other group can have a place in the result of Collective Intelligence. This can emerge because of the flaw of authorities, leading the project, thinking or improper application of Collective Intelligence, as well as being not prepared to deal with the decision or result. Such problem often arises together with a problem of unassigned liability, which causes poor collective decisions. Loss of control problem gets more serious when a group decides to attract outsiders in collaborative decision-making (Bonobeau, 2009). A danger of a shift of opinion leadership to the undesired party may occur, followed by the snowball effect. Also, a risk of information disclosure about an ongoing project or organization by itself is possible when outsiders are involved (Skaržauskienė et al., 2013).

The listed threats, connected with loss of control, are not the only ones. Another concern, which should be mentioned, is a possibility of abuse. In cases, where virtual environment is used for collaborative communication, people may spend more time discussing non-work related subjects and use both internal and external online networks to attack fellow employees or management. Business organisations apply various measures when minimizing such risks, e.g., forbidding chats on non-work related topics, blocking possibilities to connect to various

social networks or censoring critical opinions. These kinds of restrictions sometimes become obstacles for effective Collective Intelligence or virtual collaboration development (Skaržauskienė et al., 2013). One more very important aspect of the issue of risks for using CI is diversity of connected people. This risk and uncertainty in Collective Intelligence development are related to the balance of diversity and member expertise. Of course, diversity of participants grants a number of advantages for CI compared with individual efforts of solving certain problems.

Thus, diversity-based approach can lead to distorted decisions. There is always a risk of gathering together individuals with simply a lack of necessary knowledge and capabilities as well as even an ability to understand the essence of the problem. Especially in platforms, where self-identification is not required, it is impossible to control the abilities of involved participants. At the same time, expertise groups get into danger of becoming too stagnated, conservative and narrow (Skaržauskienė et al., 2013). New ideas cannot be born without new attitudes towards the problem, new approaches towards resolution of it. Considering this aspect, groups which are supposed to give birth for CI, should be balanced on all possible grounds from gender to expertise level and experience in related area.

Another issue related to individuals" participation characteristics in the collaborative communication is their engagement and motivation (Skaržauskienė et al., 2013). As Bonobeau (2009) proposes, activity coordination "must provide a continuous flow of the new, enthusiastic participants to keep engagement high, or they need to provide incentives to sustain people's motivation over time". In other words, people, who are involved in activities, which are supposed to emerge the CI, should be motivated to do it. According to Malone et al. (2010), one of the key elements (or genes, as it was named by the cited authors) for emerging of CI is motivation of involved people. In short, Malone, Laubacher and Dellarocas found out that there are three basic aspects, which motivate people and encourage their active participation in CI systems: money, love and glory. These three essential values encourage people to get involved in certain activities. The goal of management in every CI system is to find the most appropriate motivator for a particular project. Moreover, it should be emphasised that money is not always the best choice. There are many examples, when people take part in certain activities without monetary

gain (Wikipedia, Linux, Amazon books review system, etc.). It is notable that motivation of virtual activities is more based on "reliance on the Love and Glory genes, in contrast to traditional organizations, which have relied more heavily on Money as a motivating force" (Malone et al., 2010).

Further risk analysis of using CI is connected with legal aspects of fulfilment of CI oriented activities in the Web. As it was mentioned before, main risks of using CI systems are closely connected with the issues of safe interactions in the Internet: privacy, identity theft, Internet censorship, etc. In recent decades, Internet-related crimes in general have been awarded an exclusive focus by national as well as international legislators. Offences committed in virtual reality at the end of the 20th century were described as novelty. An increased amount of offences fated the need to assess the existing legal regulation and improve it by criminalizing specific acts, which may be committed via the Internet. One of the most important and widely discussed problems in practice as well as in scholarly society is a threat to privacy of people connected into various social networks. At the international level, the regulation in the field of privacy issues is mainly concentrated in two documents: the Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (1981) and the OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (1980). These two documents at the international level, together with certain provisions, protecting privacy in the European Convention for the Protection of Human Rights and Fundamental Freedoms (1950), have created a framework for other regulations. In the European Union legislature, there are two directives concerning data protection: EU Data Protection Directive (1995) and the EU Directive on Privacy and Electronic Communications (2002). In the EU Data Protection Directive, personal data is described as all information relating to an identified or identifiable person, either directly or indirectly. This directive also lists the main principles of data protection, which should be used in creating favourable environment for data exchange: the principle of fair and lawful processing, the principle of minimalism, the principle of purpose specification, the principle of information quality, the principle of data subject participation and control, the principle of disclosure limitation, and the principles of information security and sensitivity. These legal acts, building a system of data protection, were implemented in the national legal systems and guaranteed equal standards

of data protection around the EU. These aspects are very important in the context of online communities' activities. "The personal information a user posts online, combined with data outlining the users actions and interactions with other people, can create a rich profile of that person's interests and activities. Personal data published on social network sites can be used by third parties for a wide variety of purposes, including commercial purposes, and may pose major risks such as identity theft, financial loss, loss of business or employment opportunities and physical harm" (Opinion 5/2009 on Online Social Networking). Yet, it should be noticed that the existing EU legislation no longer meets the needs of the real situation in case of networked communities. It stands to reason, as when the EU Data Protection Directive was created, social networks were not popular yet and related problems could not be covered. However, the new legislation has not been adopted yet, thus, many legal issues remain unresolved. The second directive, well known as E-Privacy Directive, mainly deals with the regulation of such issues as confidentiality of information, treatment of traffic data, spam, cookies, etc. It is generally connected with electronic communications, therefore, not intended to regulate specifically the online communities' activities.

Despite the existing legal regulation on data protection at the EU and national level, many problems are connected with jurisdiction of certain disputes. One of the examples is Facebook. Users are uploading their data on the Facebook website directly to the US. In this case, EU data protection laws to protect the data rights of EU residents cannot be applied, as they are voluntarily submitting their data outside the reach of EU jurisdiction (Trichkovskaja, 2012). As Facebook users commonly are not professionals in electronic communication, they do not even predict the complexity of legal relations, which are initiated while registering themselves in Facebook platform. Such problematic questions do not have borders and must be settled at international level; this is a very long and difficult process of finding compromises between various actors of such relations.

The issues of privacy consist of several problematic aspects when it is related to generating Collective Intelligence via virtual communities (Skaržauskienė et al., 2013). At this point, privacy is concurrent to personal data security. Communication in social networks guarantees possibility to share personal information with a closed circle of persons, thus, at the same time the possibility for such data to become accessible for millions

of people all over the world remains (Štitilis et al., 2012). The behavior of people is quite different in virtual life compared to reality. Intentions for preservation of unreasonable personal data disclosure in real world falls down in virtual reality: people expose photos, events of personal life as well as professional life, and such data are easily accessible to strangers despite various privacy technologies, provided from the managers of social networks (Skaržauskienė et al., 2013). The most convincing example of people reckless behaviour is providing a huge amount of information, while registering in Facebook. According to Trichkovskaja (2012), the personal information collected by these application providers is far beyond the purpose for which they have been collected, covering almost everything the user has published on his or her profile and information about user's friends. Participants in virtual projects cannot imagine how this information in the future may be used for the interests of administrators. In reality, citizens are not intended to provide unnecessary information. People are prone to reveal much more about them online if asked or just by their own will than in the real life world if, for example, stopped on a street (Trichkovskaja, 2012). In virtual life, people have the impression that they are anonymous, thus, all information and much more, which is needed to identify them, is already provided. According to Goldie (2006), "by relying on anonymity, the virtual community members felt free to express themselves, and thus prevented the overreaching social control that expressive privacy protects against". At this point, the legal aspect of personal data protection also has quite a close connection with managerial risk of "Loss of control" from individual perspective. Anonymity often guarantees a better self-expression. In the process of generating Collective Intelligence, anonymity is very important, as it gives a clear reflection of the needs of members of the networked society (Skaržauskienė et al., 2013). On the other hand, it also creates an impression of absolute freedom of actions. Losing the control and feeling free to act without any responsibility often may drive towards violation of rights of other people. In the Internet as well as in reality, every person can use his/her rights and fulfil obligations in such a manner that his/her action would not violate the rights of other people. According to this fundamental rule of law, everybody has freedom to act, thus, one's rights cannot become a reason for breaking the same rights of others. Personal data as one of the forms of privacy requires protection based on the same fundamental rule. Thus, these natural protection mechanisms are

not always sufficient. The need for certain regulation of such issues has been observed. Joinson and Paine (2009) suggest to reveal the problem of privacy in the Internet through two different dimensions of control: environmental control (connected with prohibition to access the personal information for unauthorized subjects) and control over secondary use of information (connected with possibility to use once published information secondly only with an individual's knowledge or consent). In regard to both these dimensions, the need to create legal fundamentals is obvious. In recent decades, as aforementioned, national and international legislation bodies have paid a lot of attention for regulating the legal relations, which emerge in the Internet and are quite new and specific to compare with relations, which are common in reality. Thus, this area is steadily evolving, as well as threats connected with privacy and personal data protection are continually transforming and becoming more and more complex.

Networked society is mostly based on the ground of trust, meaning that any data provided by the member is not fully verified. Such proposition intends to drive us towards another legal risk of virtual communities – the false identity issue. What harm can false identities cause? First of all, with the use of false identities manipulation, deceit, uncertainty and mistrust are spread in online communities (Ratkiewicz et al., 2011). It is evident that in social network or virtual community a false identity is not operating in isolation (Thomas et al., 2012; Ratkiewicz et al., 2011). Scholars argue whether the public has the right to know when one person's message is deceptively repeated through multiple fake entities to give the impression of widespread support for a person, their theme or their narrative (Cook, 2014). The problem of false identity has two aspects. Firstly, the accurate identification of a person is problematic. Secondly, the protection of personality, who does not want to be revealed or, in other words, protection of virtual personality, is problem-oriented (Skaržauskienė et al., 2013). According to Kokswijk (2007), virtual identity is only a temporal and innocent phenomenon, which disappears when a computer is switched off. In most cases, it does not make sense to control the correctness of personal data, thus, in such fields of applicability of Collective Intelligence as the participation in decision-making, the personality may be very important. The above listed managerial risks included the problem of too high diversification of participants. Open access to CI systems, of course, are facing the fact that part of participants will not have adequate motivation, knowledge, capability and experience

to decide on particular issues. Too high level of diversification is also connected with the problem of false identity. People with some specific interest may be inclined to take a part in CI systems, in order to change the "wisdom of crowd" in a certain direction. The growing use of virtual communication and its development in public sector, creating the new functions of networked societies, presume the need of a certain system, which should guarantee the balance between the privacy and freedom to express oneself and fair and open interaction in system where it is crucial to guarantee the possibility to act in CI system only for the people who are not motivated to influence the results of the process towards their personal interests. For example, at the municipalities" level, it is important to involve community into decision-making. The networked societies are one of the keys how to make such participation more effective, cheap and accessible for a wide circle of inhabitants. Thus, the problem appears how to secure that in the generation of decisions only people living in a certain area would be involved? This managerial/legal aspect creates the threat that in certain circumstances the unfair behaviour of networked society members can violate the interests of local community (Skaržauskienė et al., 2013). There is a huge number of social networks, which apply different requirements for identification of members. In some fields where Collective Intelligence may be used, the identification of a person may play a crucial role for securing the source of information. This fact presumes the need of considerations on the issue of identification of members. This aspect becomes more and more important in regards to public sector in Internet oriented activities. Social technologies create possibilities to involve more people into a certain activity. CI, as a method of decision creation, in the public sector may be applied in various forms very effectively, thus, this area is very susceptible for manipulations, what gives a signal for a necessity to create a reliable system of identification, which would be balanced in regards to people's privacy. Another threat, which is connected with identification of networked participants, may appear using CI via networked societies is a risk of involving children in social networks designed for adults (Skaržauskienė et al., 2013). According to researchers (Small et al., 2012), it is impossible to identify vulnerable populations, such as children. For example, Twitter states that users must be over 13, but there is no way of verifying the age of a user based on the tweet content (Small et al., 2012). It can be predicted that identification may become crucial in cases connected with society-oriented

results, gained through the activities of networked societies (Skaržauskienė et al., 2013). Another problematic area, connected with virtual ID, is identity theft. A wide use of the Internet and e-commerce has taken identity theft into a new level (Štitilis et al., 2011), thus, legal regulation of this issue is not explicit and completed despite its topicality.

One of the main risks, which should be investigated in this chapter, is the intellectual property issues. The violations of intellectual property rights in the Internet are often simpler to compare with the violations of the same content, fulfilled in reality. On the one hand, it has already reached an unbelievable level. On the other, it is an obvious intention of intellectual property rights owners to maximize it and to take additional advantages from consumers (Kiškis, 2011). Having this in mind, it is obvious that violations of intellectual property rights committed on the Internet have some specifics to compare with other ones. One of the most important characteristic is the speed of spreading copies of certain information on the Internet. In 1997, PC Week named the Internet as "The world's biggest copy machine". To compare with previous techniques of making copies, undoubtedly, the Internet is incomparable. According to WIPO, "on the Internet, by contrast, one can make an unlimited number of copies, virtually instantaneously, without perceptible degradation in quality. And these copies can be transmitted to locations around the world in a matter of minutes" (WIPO, 2002). Using the Internet, movies, songs, books or any other intellectual production can be shared with millions of people, who, in turn, can share that content with others, what eventually makes impossible to find a subject responsible for it. Such activities may violate rights of intellectual property owners in various areas and create huge monetary losses, which may be attempted to be regained by claims and various legal dispute resolution procedures. The networked societies, which generate the collective intellect with a purpose to use the result of it, can face such problems, too. The created result or part of it may be claimed to be intellectual property of a certain participant. Sophisticated members of the society may have some claims, concerning the ownership of proposed ideas and decisions or even results of collective interaction. An organization needs "to determine, whether and how it will assume ownership of the resulting intellectual property" (Bonobeau, 2009). It is essential to make clear the rules of participation in a certain CI system; this may help to prevent future claims in regard to intellectual property rights.

The above mentioned risks are quite common for all activities on the Internet, thus, several special points may be listed in the content of networked societies generating Collective Intelligence. People in virtual communities are linked to be more self-confident and even risky in expressing their opinion on the Internet as members of a certain virtual community (Skaržauskienė et al., 2013). For example, research findings indicate that people who are taking part in various virtual communities are inclined to take more risky financial decisions (Zhu et al., 2011). Considering the legal aspect, the analogy with socially undesirable behavior can be made. People sharing their discriminatory views on the Internet obviously violate the rights of people belonging to a certain group and the society in general. It is worth emphasizing that hate speech in Lithuania is mostly connected with instigators' comments in information portals, social networks (Skaržauskienė et al., 2013). The Human Rights Monitoring Institute has revealed that more than 90% of all hate speech acts in Lithuania are committed on the Internet (Bitiukova, 2011). As it was mentioned before, to lose control of socially acceptable behaviour is usually easier in virtual reality, as participants suppose that nobody will find out their real identity. Nowadays, the situation is becoming more and more controlled, as legal regulations concerning punishments of offenders, who insult others even on the Internet, have already been adopted. Thus, this area may continue to be called very risky.

A censorship of information provided on the Internet may be named as another important legal risk. According to Ziotrain and Palfrey (2008), the control of the Internet content is long-standing. The freedom of expression has never been absolute. Thus, this process is closely connected with legal issues because Internet control is implemented with the help of various legal instruments (Skaržauskienė et al., 2013). The process of generating Collective Intelligence is also vulnerable by the mentioned problem. In the process of generation of Collective Intelligence, none of information should be missed. If the final result of Collective Intelligence is censored, such intellectual production cannot be presented as an outcome of collective work in regard of contradiction of such censorship with general legal principles of rationality, good faith and justice (Skaržauskienė et al., 2013). This aspect is very important in the field of public sector. As nowadays people are not inclined to involve themselves actively in decision-making processes, social technologies may help the public sector to attract residents by easier

accessibility of civil engagement. Thus, people, who get involved in socially oriented activities, normally motivate themselves by the above-mentioned aspects of motivation, such as money, love and glory. One of the outcomes of social interaction is the real impact towards decision, which was passed. Knowing this fact, it is essential to evaluate all proposed ideas and not allow framing a decision using only admissible arguments and passing through ideas, which do not confirm the attitude of the decision-making body. The members of the networked society must be clearly introduced with the rules of participation and possibilities to restrict their right to self-expression. In this case, it is crucial to find a balance between the whole society and particular networked community's interests, supporting the attitude that the initiative of governmental agencies in the field of Internet censorship with a goal to restrict the spreading of ideas is inappropriate for official policy of the state (Skaržauskienė et al., 2013).

It could be concluded that the main risks associated with Collective Intelligence employment are the loss of control over the project, possibilities to abuse the process, too high level of diversity of participants, motivation of participants, issues of privacy, false identity and intellectual property issues and censorship. These aforementioned risks may be described as a system, as each of them has a close relation with the other ones. **Figure 6** provided below schematically shows the relations between all the discussed managerial and legal risks.

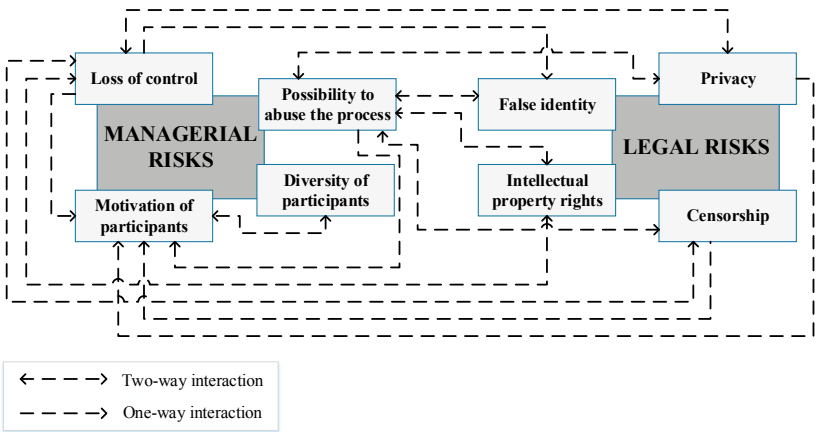

Figure 6. Inter-relations between managerial and legal risks

Source: developed by the authors

The risks analysed in this chapter could be named as the main threats, which networked societies are facing. The main managerial problem in this context is a threat of losing control. Adoption of a certain CI system always means passing a part of control from the management board to the crowd and these processes are sometimes difficult to control. Loss of control risk is closely related to such legal threats as violations of privacy or creation of false identities because the lack of control at managerial level may often create an area for data leaks and abuse. In addition, loss of control is connected with censorship. In case managers understand that they actually do not control the activities in their virtual network, they may try to censor them. In addition, it should be stated that people should not abuse their freedoms and, in the context of CI systems, may use social technologies not for their direct purpose, but for not related activities. It means that they may start to behave against legal regulations and violate the rights of other members of a certain virtual community. Such violations may be connected with their privacy, intellectual rights or other factors. Too high level of diversity of participants creates an opportunity for involvement of people who do not have enough knowledge, competence or experience to deal with certain issues. It often leads to demotivation of people (managerial risk). Members, who have the competence and knowledge in certain areas, easily recognize the ones, who do not have any understanding about an issue. If such participants start dominating, expert members will naturally lose their motivation to act in such community. The last managerial risk – motivation – is an obligatory element of CI genome: participants must be motivated in order to involve themselves, to stay involved and to be active in certain CI systems. Without motivation and maintenance of it, people normally lose their interest and do not fulfil tasks, which were assigned to them. This risk is also connected with other listed risks. Moreover, it has close relations with major legal risks. People do not feel motivation to be active if they experience some threats, for example, a threat to their intellectual property rights or private data.

From the legal perspective, the main problems are connected with the necessity in every situation to find a balance between privacy and requirement to identify oneself, between the positive outcomes of high standards of intellectual property protection and the effect of CI as a perfect form of problem solving and between the need to control the content of virtual communication (for preventing human rights violations) and the

right of virtual community members to express themselves, to share their attitudes and thoughts freely. The relations between legal risks and other identified risks are presented in Figure 6. It is obvious that legal risks mostly depend on the managerial level excellence. If the platform is well managed, it is possible to block the appearance of the mentioned legal threats. The listed risks show the necessity of strict formulation of certain rules in the process of designing the CI system. Participants should be informed about the policy of managers of the network in regard to all discussed risks.

The exclusion of managerial and legal risks also gives a hand to proper evaluation of activities of existing virtual communities and may be used for their analysis. In Table 5 provided below, the main indicators for evaluation of the managerial and legal risks are presented.

Table 5. Main risk indicators of using CI in virtual networks

Group of risk	Risk	Indicators	Notes	Measurement
Managerial risks	Loss of control	The control of results: possibility to erase, filter information, participants, etc.	Related to the diversity of the participants risk	Yes/No
		Poor management: Is the functions of administrator clearly described? Does he fulfil it? Is the liability of administrator described?	Related to the motivation of the participants risk	Yes/No
		Are the aims of activities clearly stated?		Yes/No
		Do the real activities confirm the declared aims?	Related to the possibility to abuse the process	Yes/No
	Possibility to abuse the process	What power does the participant have for controlling their personal information?	Related to privacy risk	Degree
		Is it stated which activities network is designed?	Related to loss of control risk	Yes/No
		Do the real activities confirm the declared aims?	Related to loss of control risk	Yes/No

	Diversity of the participants	Is any identification of users required?	Related to false identity risk. It should be noted that in case such identification is not required, there is no aim to research this indicator.	Yes/No
		Degree of diversity according to characteristics, such as gender, age, country, etc.	It is necessary to reach a high level of diversity and a balanced content of it.	Degree
	Motivation of the participants	Is any motivation system for the active participation applied?		Yes/No
		Are the aims of activities clearly stated?		Yes/No
Legal risks	Privacy	Does the information which is necessary to provide during registration confirm the real needs?	In cases when too much information is required. for example. for registration, big threat of false identity theft appears.	Yes/No
		Is the privacy of the participant guaranteed?		Yes/No
		Are measures for privacy protection sufficient?		Degree
		Is the identity of the administrator of the network known to participants?	Who is responsible for the violations?	Yes/No
		Does the network have privacy policy?		Yes/No
		Is the participation in the network regulated by certain rules?		Yes/No
		Is it possible to participate in network's activities anonymously?	Anonymous participation awakens creativity, thus, at the same time creates threats for loss of control.	Degree
		To what degree a user can manage his privacy options?	Possibility to abuse the process and personal data security principles are often in conflict.	Degree

	False identity	Is the certificated identification required?	For example, Facebook requires identification through the e-mail box, other networks may require even identification through electronic banking systems, etc.	Yes/No
		Are there any provisions in policy of the network regulating the liability issues and providing instruction how participant should behave in case of such violations?		Yes/No
	Intellectual property rights protection	Is the amount of information about the author sufficient to identify him and to guarantee his rights?	Here, the conflict between privacy issues occurs. In case to secure privacy, it is necessary to provide only a minimum amount of information. In case of intellectual property rights preservation, such amount of information often is not sufficient.	Yes/No
		Does the policy describe principles of intellectual property rights?		Yes/No
		Does the policy envisage the liability for intellectual property rights violations?		Yes/No
	Censorship	Are there any technical tools implemented to filter the participants and information?		Yes/No
		Are there any tools of post censorship?		Yes/No
		Is there any policy in the field of these two above mentioned issues created and available for participants?		Yes/No

Source: developed by the authors

It should be concluded that managerial and legal risks play a huge role in the process of involvement of people into virtual activities. Although this impact cannot be noticed at first sight or in the first interactions, over time participants often start evaluating threats, which they are facing during their actions in social networks. The main identified risks and indicators of their emergence should be evaluated as useful tools for attracting people to participate in certain activities as well as maintaining their interests in it. CI generates a new quality of knowledge, thus, to manage its emergence and development is an important and very challenging task, which requires having good knowledge about all possible risks and competence of coping with them.

3. SYSTEM APPROACH TO COLLECTIVE INTELLIGENCE

3.1. Methodology for Collective Intelligence Monitoring Technique

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The third part of the monograph presents methodology of the scientific research that facilitates empirical evaluation of the scrutinized phenomenon. However, the main focus of the Collective Intelligence Monitoring Technique is not on a self-expedient analysis of Collective Intelligence (CI) as a phenomenon, but the scientific identification of preconditions for Collective Intelligence to emerge, the enunciation of holistic conceptions, the prediction of possible development scenarios and the collection of empirical data on the value of Collective Intelligence for society. Many researchers have presented significant results in identifying the potential of Collective Intelligence to solve various societal problems or in modelling CI from a conceptual point of view (Luo et al., 2009; Malone et al., 2009; Barahona et al., 2012; Salminen, 2012; Kittur et al., 2013; Prpić, 2014), but, according Lykourentzou et al. (2011), they do not focus on an essential problem – "CI system design and optimization processes, through which collective intelligence will be able to emerge in a systemic manner". The present system approach for a Collective Intelligence Monitoring Technique is distinct in a wide range of methods, preconditioned by complexity of the scientific problem and the synergy of the project team members' competences. Projects of online communities that use innovative instruments of collective decision-making and mechanisms to encourage personal and collective creativity, entrepreneurship and cooperation facilitating origination of new self-governance and self-organization forms were chosen as the research subject (Skaržauskienė and Pitrenaite-Žilėnienė, 2013). Such platforms of indirect communication are treated in the research as environments for the development of Collective Intelligence (more on the issue in Chapter 3.2.). Recent research results of Engel et al. (2014) have shown that a Collective Intelligence factor characterizes

group performance for online groups approximately as well as for face-to-face groups. The key strength of the research methodology is that the CI phenomenon is examined by applying various scientific approaches to combine a range of perspectives into a systematic dynamic model of Collective Intelligence and develop a CI observation methodology based on the CI Potential Index calculation. The research methodology is shown schematically in Figure 7.

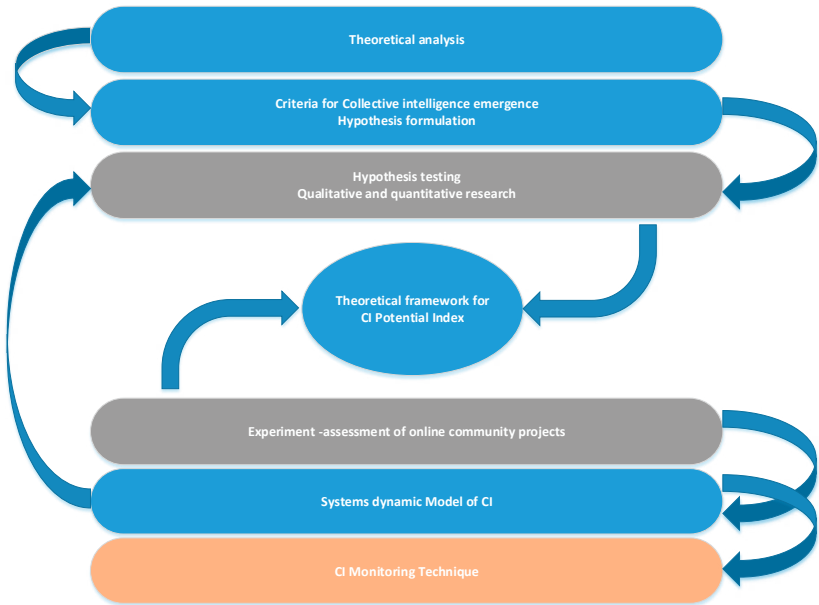

Figure 7. Methodology for CI Monitoring Technique

Source: developed by the authors

Having assessed and integrated various approaches to CI, criteria for a CI emergence were identified and hypotheses on the impact of individual factors on the CI potential in online communities were formulated. These hypotheses were tested in the course of quantitative research and analysed during the qualitative research. The respondents were chosen to include both the most active initiators of the CI formation and present or potential members of online communities. The quantitative research identified the extent and trends of involvement and participation of CI development actors and other stakeholders (more on the issue in Chapter 4.2.). In

order to achieve a statistical sample and the credibility of data collection procedures, services of a public opinion and market research company were used to deliver surveys of at least 1000 respondents. The quantitative research has also established the construction of the active Internet user profile and identification of the key legal risks in participation in online communities (more on the issue in Chapter 4.3.). The qualitative research was conducted to broaden knowledge about processes taking place during initiation and implementation of online community projects and to collect empirical data on features, singularities, stimulating factors and obstacles for Collective Intelligence to emerge (more on the issue in chapter 4.1.). The majority of the interview topics were associated with interactions of the participant in the online communities chosen for the experimental research. Results of the qualitative research have complemented insights of the quantitative research and grounded the model of CI Potential Index (the actual links are described in Figure 7). Next, the key dimensions, components and indicators of the index were identified and the indicator measurement scales were designed. The model was validated during a scientific experiment and the correlations between the variables were tested by developing a system dynamics model (more about the model in Chapter 5.5.). The CI system dynamics model has identified the key factors of the real CI system and designed the relationships in the feedback diagrams. The identified variables and parameters were combined into a model system that reflects the process of CI emergence and development.

The scientific experiment was launched alongside with the quantitative and qualitative research. As it was impossible to have a control group and experimental groups with identical features, quasi-experimental research methods were invoked. Selected community projects were observed in accordance with the designed survey scheme (representative parameters). A qualitative analysis of the data was summarized in several conclusions (presented in Chapter 4.1). At the onset of the experiment (exploratory stage), the researcher conducted a natural experiment with no direct interference into the activities of the researched online community. During the second stage, after developing the CI Potential Index methodology, the experiment went on to evaluate the CI potential in several chosen online communities (active societal community projects were already identified in the first stage of the experiment). This stage incorporated negotiations with platform developers and administrators to get access to specific *web*

analytics data. Besides organizational behavioural factors, the experiment evaluated social technological tools adapted in the platform.

The Collective Intelligence Monitoring Technique was developed based on the theoretical framework of CI Potential Index. After aggregation and normalization of the numerical data, assessments of the probability of possible deviations (e.g., insufficiency of data) were made and individual index component weights in the index calculation formula were determined. The developed methodology will be adapted for the virtual scientific environment based on automatic data storage and algorithmic data analysis. The CI Monitoring Technique will incorporate opportunities to calculate the CI Potential Index and to monitor the CI emergence and development processes in networked structures (online communities, virtual platforms, etc.) by collecting empirical evidences. The proposed methodology will allow identifying and analyzing conditions that lead communities to become more collective intelligent**.**

3.2. Collective Intelligence Systems – Online and Virtual Communities

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All the types of human groups can be regarded as a source of Collective Intelligence (or community intelligence). Community, according to Luo et al (2009), "refers to any human group in which the members have some common characteristics, share same interests or views, have similar purposes". Luo et al. (2009) distinguishes different levels of Collective Intelligence: team level, business level, global level and community level, which scientists position in between the above mentioned levels. For community intelligence, to form exchange and consensus building between the community members is essential. Hasty evolution of the Internet enabled new efficient ways of knowledge exchange within communities; consequently, the virtual and online communities are of particular importance (Luo et al., 2009).

American researcher Turoff (1976) predicted the dawn of modern online communities. He said that "computer-based conference could provide human beings with a way to exercise their collective intelligence

capacity and show a greater degree of intelligence as compared to any of its members". Such thoughts lead to a vision of collective activities focused on trade of data, information, knowledge using integrated network of computers (Costa, 2006). According to Johnson (2001), first years of the Web can be defined as embryonic phase, which based itself on its cultural ancestors (e.g., television, radio, newspapers, shopping malls, etc.). However, one can observe something "utterly new, a type on second wave of the interactive revolution triggered by the computer: a model of interactivity based on the community, on the many-many collaboration" (Costa, 2006). Emergence of virtual communities has been criticized for the limited physical contact between the participants. However, refusing to take attention to virtual communities would ignore modern technologies of collective movements (Baumann, 2003). Levy (2002) suggest that "online communities are a new way of making society with the support of new communication technology based on objective collaboration rather than on close and persisting bonds". More importantly, "conveniently organized virtual community represents a wealth of distributed knowledge, capacity for action and potential for cooperation" (Levy, 2000).

Following Porter (2004), "a virtual community is defined herein as an aggregation of individuals or business partners who interact around a shared interest, where the interaction is at least partially supported and/or mediated by technology and guided by some protocols or norms". Virtual/online community is a community "in which the computer-mediated communications (CMC) are the prominent means for the community members to interact with each other" (Stiles and Cui, 2010). Lykourentzou et al. (2011) define online community as a "system which hosts an adequately large group of people, who act for their individual goals, but whose group actions aim and may result – through technology facilitation – in a higher-level intelligence and benefit of the community". Similar as in the case of "swarm intelligence" in natural systems, Collective Intelligence systems consist of human beings and supporting ICT systems. Human intelligence blended together with intelligent machines enable communities to resolve problems and achieve unprecedented results. With the support of the ICT, "the communities may exhibit higher intelligent features than a traditional community does since ICT firstly provides an effective communication channel for massive exchange of data, information and knowledge and secondly the computation capabilities of

the modern ICT may be of great help for the information processing tasks within the entire community" (Stiles and Cui, 2010).

Terms "virtual community" and "online community" are usually treated as synonyms. However, in this research, the term "online communities" will be used based on argumentation of Luo et al. (2009). Their work defines an "online community" as the community "that uses the computer network (and in particular the Web) as the primary communication media, while "virtual community" is a more general phrase referring to the community that is mediated via all sorts of telecommunication technologies". Literature analysis revealed a variety of typologies for categorizing online communities as active, collaborative CI systems. Communities can critically differ from each other in their size, structure, way of communication, etc. The growth of communities and the development on the supportive information technologies greatly stimulate the corresponding studies in the pedagogical and managerial fields, resulting in the extensive discussions in topics, such as "learning communities" (Gabelnick et al., 1990), "community of practice" (Lave and Wenger, 1991), "community of interest" (Fischer, 2001), and "knowledge building communities" (Scardamalia and Bereiter, 1994), etc. Even though CI systems may differ in terms of users or purpose, but they all seem to share a number of common characteristics, e.g., they all require participation of an adequate number of users who act individually, but share similar goals as a community (Lykourentzou et al., 2011). Often, communities are classified according to interests of their members, for example, educational, medical, religious or political community (Preece et al., 2003, 2004). Lykourentzou et al. (2011) divide categories of collaborative and competitive CI systems. Different scientific disciplines tend to distinguish the types of virtual communities only suitable for their research area. For example, researchers of information systems (Preece, 2000; Stanoevska-Slabeva, 2002) classify communities according to the types of assistive technologies used (chat rooms, bulletin board, etc.). Business management researchers classify virtual communities based on different objectives of communities, such as revenue generation (Plant, 2004) or customers (Armstrong and Hagel, 1995).

Porter (2006) offers an interdisciplinary classification system, which allows scientists from different fields to adapt it to their work. The key variable of this system is establishment type of the community. In the first group, online communities can be *initiated* and managed *by their members*. The

relationship within these communities can be oriented towards *professional* or *social interaction*. The second group of communities is sponsored by different organizations (commercial, non-profit, governmental) and is used to achieve their specific goals. For better understanding, we have applied this model and reviewed existing Lithuanian online communities tackling societal challenges. The classification system is shown in Figure 8.

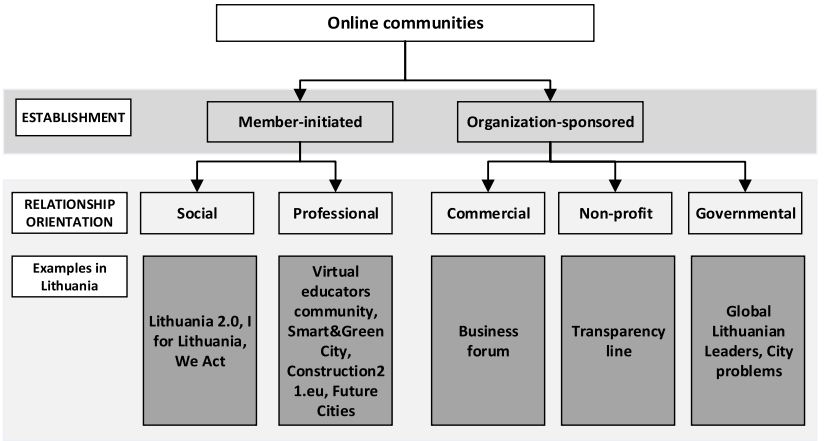

Figure 8. Classification of online communities in Lithuania

Source: adapted from Porter (2006)

Communities with *social orientation* are based on member interaction with common interests. This type of community could be held a primary one because they were started together with the development of the Internet. There is a number of online communities of such type in Lithuania for members to discuss their ideas and problems. Advanced platforms of such type are *Lithuania 2.0* and *I for Lithuania,* which have been developed for ideation and discussion of social issues. Social technologies used in these platforms allow individuals, families, communities and organization working together to promote the common goal – fostering social innovation, ecological thinking, citizenship and social activity.

Online communities with *professional orientation* are designed for professionals who can share information and find solutions for problems together with colleagues from other organizations. The best example in the

case of Lithuania is a virtual community of educators. Another example of such type of community is *Smart & Green City* focusing on joining people and organizations for discussing optimal and innovative use of natural energy resources.

According to Porter (2006), communities could be established using the support of different organizations. The communication and orientation of these communities are directly related to the organization's mission and goals. As the online community projects and platforms are explored in the context of social challenges, it is hard to find examples of *commercial online communities*. Closest to this category is *Business forum* initiated by Association of Youth Business Club. The forum is used as a platform to share opinions, good and bad practices and to develop constructive dialogue with all interest groups supporting entrepreneurship.

Elements of *non-profit online communities* are best reflected in the platform *Transparency line* curated by Transparency International Lithuanian Chapter. Site visitors become members of the community by reporting observed or possible acts of corruption.

Governmental online communities are created by public organizations to achieve their goals. *Global Lithuanian Leaders* platform aims for searching economic opportunities for Lithuanian products. Vilnius City Municipality initiated project *Do business* happening annually is another great example of non-governmental online community. Through the use of social network Facebook, it brings an opportunity for entrepreneurial people to interact and solve problems. This community helps to meet like-minded, get answers to business problems from experienced entrepreneurs and experts from other areas (marketing, law, etc.). Organization sponsored communities actively exploit the advantages of the virtual space and tools enabling users to share views and ideas on how to improve the life of society.

Review of online communities using Porter's classification system allowed better understanding of Lithuanian projects and platforms tackling societal challenges. The number of such projects attests a growing desire of Lithuanian citizens to actively participate in decision-making processes and contribute to the creation of CI. Next chapters will overview not only international online communities, which foster emergence of Collective Intelligence in groups, but also will further analyse Lithuanian communities.

3.3. An Overview of International Collective Intelligence Initiatives

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By analysing Collective Intelligence (CI) initiatives at the international level, the diversity of them draws particular attention. Within this context, a general definition of CI, described in chapter 2.1. of the monograph, was used to serve the analysis' purposes.

For cross and compare purposes, all international CI initiatives in this article were grouped into the following large groups:

1. Sharing/creating knowledge;
2. Decision-making/problem-solving;
3. Social collaboration;
4. Life-long learning/learning organisation.

Taking into consideration that these groups may contain some variety within each group, the number of sub-groups were identified and described for further analysis. The analysis itself was performed at the following indicators described in detail in chapter 3.4. of the monograph:

1. Participant/group variety (demographic, educational, cultural, etc.);
2. Group dynamics (teamwork (virtual access, off-line collaboration, anonymity, team management, etc.) / individual participation in the group);
3. Impact of time and location (anytime, anywhere);
4. Anonymity/publicity solutions (full/partial anonymity, use of nicknames, etc.) / publicity solutions);
5. Idea generation methods (idea generation methods, such as knowledge accumulation: information exchange, discussion, offline workshops and meetings, communities of practice interaction; or idea generation: brainstorming, voting, game, contest or market generated knowledge);
6. Strategic decision-making (idea generation/decision to act);
7. Group size/critical mass;
8. Self-regulation (structural decision-making, leadership, conflict management, crowd vs hierarchy).

Finally, the following dimensions were compared across all CI groups described in the article, because they are the main driving forces that

stimulate all possible parties around one or another CI platform (such as users, contributors, inventors, participants, platform "owners", etc.) to act:

1. Motivation of participants;
2. Technological solutions of the platforms;
3. Business model of the platform.

It is also worth mentioning that the list of CI platforms was not exhausted. There are much more initiatives still out there. For the analysis' purpose, the number of large and most typical CI platforms were selected and presented in this article.

"Mapping" of the international CI initiatives. The following Table 6 summarizes the overview of all platforms analysed in this article.

Table 6. Grouped examples of CI international initiatives

Group	Sub-group	Examples
1. Sharing/creating knowledge	1. Collective knowledge through small user generated individual contributions	Wikipedia (http://wikipedia.org/)
		TeamLiquid (http://www.teamliquid.net/)
		Intellipedia
		WikiHow (http://www.wikihow.com)
		Answers.com (http://www.answers.com/)
		How stuff works (http://www.howstuffworks.com/)
		Git hub (https://github.com/)
	2. Knowledge accumulation and sharing as individually managed global scientific information resources	Chemical Abstracts Service (CAS) (http://www.cas.org/)
		FIZ Karlsruhe (http://www.fiz-karlsruhe.de/)
	3. Knowledge accumulation and sharing as free access to professional knowledge	Avvo (http://www.avvo.com)
		HealthTap (https://www.healthtap.com)
	4. Knowledge sharing as global and local community engagement for change	TED (http://www.ted.com/)
2. Decision-making/problem-solving	1. Collection creation/ Decision support	The Millennium Project (http://www.millennium-project.org/ and www.themp.org)
		Innovation Exchange (IX) (http://www.innovationexchange.com/)
	2. Open innovation as business knowledge (collaborative creation)	The Lego Digital Designer (http://ldd.lego.com/)
		BMW (http://www.hyve-special.de/bmw/index1.php)
		IBM (https://www.collaborationjam.com/)

	3. Collaborative/co-creation of innovation/community-based invention engine/ social ideation	Quirky (https://www.quirky.com/)
		Ycombinator (http://www.ycombinator.com/)
		AHHHA (http://ahhha.com/)
	4. Crowdsourcing for problem-solving/intelligent crowdsourcing	InnoCentive (https://www.innocentive.com/)
		Hypios (http://www.hypios.com/)
		Topcoder (http://www.topcoder.com)
	5. **Creativity and new idea generation:** Idea **contests** with backup support/"social think-tank"	Idea Bounty (http://www.ideabounty.com/)
		eYeka (https://en.eyeka.com/)
		Zooppa (http://zooppa.com/en-us)
	6. Crowdsourcing as outsourcing/**Virtual (Labour) Marketplace**	Amazon's Mechanical Turk (http://www.mturk.com/)
		Clickworkers (http://www.clickworker.com/en/)
		Kaggle (http://www.kaggle.com/)
	7. Collaborative design markets (video-crowdsourcing)	Userfarm (https://www.userfarm.com/)
3. Social collaboration	1. Content sharing	Digital Photography Review (http://www.dpreview.com), Youtube (https://www.youtube.com), Shutterstock (http://www.shutterstock.com/), Reddit (http://www.reddit.com), W3C (http://www.w3.org/community), Pinterest (http://www.pinterest.com)
	2. Civic engagement (/ participatory democracy)	Beautiful PB. Creating a Sustainable Beautiful Pacific Beach (http://beautifulpb.com/)
		Connect Lemon Grove (http://www.connectlemongrove.com)
		Pirate Parties around Europe
		Discue (http://www.discue.com/)
	3. Civic engagement (/ social innovation)	OpenIDEO (https://openideo.com/)
		One billion minds (http://www.onebillionminds.com/)
	4. Civic engagement (/crisis management)	Ushahidi (http://ushahidi.com/)
4. Life-long learning/ learning organisation	1. Massive Open Online Course (MOOP)	EdX (https://www.edx.org)
		Coursera (https://www.coursera.org/)
		Udacity (https://www.udacity.com/)
	2. Creativity and new idea generation: gamification	Venture Spirit (http://www.venturespirit.com)

Sharing/creating knowledge

General Group 1 review. The first group of Collective Intelligence platforms is assigned to the "Sharing and creating knowledge" (see Table 7) category relying on collective knowledge through user-generated content. Within this group, several sub-groups with common features and particularities are identified. The first sub-group in this category relies on collective knowledge social software applications for collaboration creating value through small individual contributions to the whole. The second sub-group of CI platforms contains examples of particular knowledge accumulation and sharing approaches, which offer global scientific information resources and information infrastructure, managed by an internationally recognized entity and available freely to both legal entities and individuals from all over the world. The third sub-group includes examples of platforms where simple Q&A forums are transformed into unique pools and live access to professional knowledge. The fourth sub-group contains an example were technology-mediated knowledge sharing is supported by a wide global network of such possibilities, including all levels of possible community engagement – global, national, regional and local.

Table 7. CI platforms: Group 1: Sharing and creating knowledge

Sub-Groups of CI platforms	Examples	The main objective of the platform	Origin/ cover-age	Main users/ platform participants
1. Collective knowledge through small user generated individual contributions (/knowledge philanthro-pists)	Wikipedia (http:// wikipedia.org)	To develop free-content online information resource.	Global	Any individual
	TeamLiquid (http://www. teamliquid.net)		Global	Any individual
	Intellipedia	Intellipedia is an online system for collaborative data sharing used by the U.S. Intelligence Community.	U.S. National	U.S. Government

	WikiHow (http://www.wikihow.com)	To develop free-content online information resource.	Global	Any individual
	Answers.com (http://www.answers.com)		Global	Any individual
	How stuff works (http://www.howstuffworks.com)		Global	Any individual/ field experts
	Git hub (https://github.com)	It is one of the biggest platforms for software developers in the world enabling them to work collaboratively on open source software development projects.	Global	Any individual or company
2. Knowledge accumulation and sharing as individually managed global scientific information resources	Chemical Abstracts Service (CAS) (http://www.cas.org)	A division of the American Chemical Society is the world's authority for chemical information. CAS is the only organisation in the world which objective is to find, collect and organize all publicly disclosed chemical substance information.	Global	Any legal person or individual/a team of scientists worldwide curates and controls the quality of the databases
	FIZ Karlsruhe (http://www.fiz-karlsruhe.de)	Supplies scientists and companies with professional research and patent information (mathematics, information sciences, crystallography, chemistry and energy), develops and offers innovative information services.	Global	Any legal person or individual/a team of scientists worldwide curates and controls the quality of the databases.
3. Knowledge accumulation and sharing as free access to professional knowledge	Avvo (http://www.avvo.com)	Free access to professional legal advice.	U.S. National	Any individual/ practising lawyers in the U.S.
	HealthTap (https://www.healthtap.com)	Free immediate access to top medical experts and their trusted health advice anytime, anywhere.	U.S. National	Any individual/ U.S. board-certified doctors

4. Knowledge sharing as global and local community engagement for change	TED (http://www.ted.com)	TED is non-profit devoted to spreading ideas, usually in the form of short, powerful talks (up to 18 min. long).	Global	Any individual/world's most innovative and influential speakers

Source: developed by the author

All these platforms demonstrate great potential for CI – through small individual contributions, they develop a unique pool of knowledge and resource for everybody's use. Moreover, they do demonstrate not only the cases of an extensive knowledge aggregation, but also various processes and means of knowledge transmission and fusion.

A traditional potential for CI is very often associated with Sub-Group 1 type of platforms, i.e., with social software applications for collaboration where value creation develops through small individual contributions to the whole. The most cited example in this respect is, of course, *Wikipedia* (http://wikipedia.org/). Later, *Wikipedia's* approach has become a prototype for many similar CI initiatives developed in different sectors and by different actors around the world. For instance, a company called *TeamLiquid* (http://www.teamliquid.net/) is an interesting example from the private sector. It provides platform for news and community website focused on a number of commercial products (computer games) of other companies, namely two international companies – *Blizzard StarCraft* (and computer game products called "Brood War" and "StarCraft 2" in particularly) and *Valve* (its product "Dota 2" in particularly). A good example from the public sector in this respect is an initiative by a state agency called *Intellipedia*. It is an online not open to the public system for collaborative data sharing used by the *U.S. Intelligence Community*. In addition to this, there are many examples of individual's generated initiatives (for instance, *WikiHow* (http://www.wikihow.com), *Answers.com* (http://www.answers.com), *How stuff works* (http://www.howstuffworks.com/) and *Git hub* (https://github.com/)). *WikiHow*, *Answers.com*, *How stuff works* – all these initiatives and products were inspired by Wikipedia and are built on the same wiki software platform. Each of the platforms offers slightly different but at the same time similar product – a collaborative effort to create a free-access and free content resources that anyone can

read, use, edit or contribute to. *WikiHow* aims to create a high-quality collection of how-to guides in any field that does not contradict law. A very similar goal is declared by other two platforms. *GitHub*, in the meantime, is one of the biggest platforms for software developers in the world enabling them to work collaboratively on software development projects, share their knowledge and learn from each other.

Sub-Group 2 contains two examples – not-for-profit organisations with public missions – *Chemical Abstracts Service (CAS)* (http://www.cas.org/) and *FIZ Karlsruhe* (http://www.fiz-karlsruhe.de/) illustrate CI cases when internationally recognized entities use field experts from all over the world to accumulate specialized knowledge for public use. The first initiative is a unit of the American Chemical Society and its main objective is to find, collect and organize all publicly disclosed substance information[21]. A team of scientists worldwide curates and controls the quality of databases, which are recognized as the most comprehensive and authoritative by chemical and pharmaceutical companies, universities, government organisations and patent offices around the world. The second initiative is part of the Leibniz Institute for Information Infrastructure and it aims at making sci-tech information from all over the world publicly available and to provide related services in order to support the national and international transfer of knowledge and the promotion of innovation[22].

Other two examples from the private sector (Sub-Group 3) demonstrate CI in specialised professional knowledge networks, for instance, *Avvo* (http://www.avvo.com) is one of the online Collective Intelligence platforms, which provides specialized professional (legal) knowledge. The main purpose of the platform is to enable its users to make more informed and more confident decisions when legal knowledge is needed or, according to the platform itself, to have no legal fear[23]. *HealthTap* (https://www.healthtap.com), in the meanwhile, is a very similar platform with the aim of sharing specialized professional knowledge in the medical field.

TED (http://www.ted.com/) is the last example (Sub-Group 4) of the platforms. It is a technological platform, which was developed by a

[21] Chemical Abstracts Service. *The American Chemical Society* [interactive]. [accessed on 2014-12-12]. <http://www.cas.org/about-cas>.

[22] FIZ Karlsruhe [interactive]. [accessed on 2014-12-12]. <http://www.fiz-karlsruhe.de/company_profile.html?&no_cache=1&L=1>.

[23] Avvo [interactive]. [accessed on 204-12-11]. <http://www.avvo.com/about_avvo>.

non-for-profit organisation with the aim to use technology enabled mediums to spread "the world changing ideas" by short but very powerful messages during *TED* conferences and other events[24]. On the organisation's website, knowledge in various fields which has been accumulated by world-class field experts, scientists and thinkers is stored and accessible free of charge by anyone interested in them. Moreover, the organisation's community consists of world's most inspirational speakers and various knowledge-eager communities initiating the discussion of ideas with each other, their professional and personal networks inside and online environments, the *TED* conferences, *TEDx* and related (linked) *off-line* events to facilitate sharing of ideas in local communities around the world throughout the year.

Analyzing Group 1 by CI indicators

Table 8. Group 1 analysis by CI indicators

CI Indicators	Sub-Group 1	Sub-Group 2	Sub-Group 3	Sub-Group 4
Participant/ group variety (demographic, educational, cultural, etc.)	H; global unrestricted technology-enabled involvement; no threshold requirements for contributors; many ways to contribute with (including intangibles); possibilities to contribute in different languages.	M; stimulation of specific broad audiences; using global expertise associates.	M; national unrestricted technology-enabled involvement; stimulation of specific broad audiences.	H; global unrestricted technology-enabled involvement; no threshold requirements for users; many ways to contribute with (including intangibles); use of both technological and non-technological mediums; various engagement levels; stimulation of specific broad audiences; possibilities to contribute in different languages; use of global field experts.

[24] TED [interactive]. [accessed on 2014-11-03]. <http://www.ted.com/about/our-organization>.

Group dynamics (teamwork (virtual access, off-line collaboration, anonymity, team management, etc.) / individual participation in the group)	H; unlimited technology-enabled virtual access; individual contributions to the whole; (managed) teamwork; off-line engagement/ collaboration possibilities in some cases.	M; collaborative work within specific scientific communities/ teams.	L; unlimited technology-enabled virtual access; individual contributions to the whole.	H; unlimited technology-enabled virtual access; individual contributions to the whole; (managed) teamwork; off-line engagement/ collaboration possibilities.
Impact of time and location (anytime, anywhere)	H; technology-enabled unlimited access.	M; technology-enabled access (fees applied).	H; technology-enabled unlimited access.	H; technology-enabled unlimited access.
Anonymity (full/partial anonymity, use of nicknames etc.) / publicity solutions	Full or partial anonymity is possible although discouraged for content contributors.	N/a	Publicity of content contributors linked to specific business models of the platforms; full or partial anonymity is possible for content users.	Full or partial anonymity is possible for content users; more openness is linked to additional benefits offered by the platform.
Idea generation methods	Knowledge accumulation: information exchange, discussion, offline workshops and meetings (e.g., TeamLiquid); idea generation: voting, game and contest generated knowledge (e.g., TeamLiquid).	Knowledge accumulation: information exchange, discussion, offline workshops and meetings, communities of practice interaction.	Knowledge accumulation: information exchange, discussion, communities of practice interaction.	Knowledge accumulation: information exchange, discussion, offline workshops and meetings, communities of practice interaction; idea generation: brainstorming, voting, game or contest generated knowledge.

Strategic decision-making (idea generation/ decision to act)	N/a	N/a	N/a	N/a
Group size/ critical mass	H; very important; linked to business models of the platforms.	H; very important; linked to business models of the platforms.	H; very important; linked to business models of the platforms.	H; very important.
Self-regulation (structural decision-making, leadership, conflict management) crowd vs hierarchy	Horizontal communication networks mainly; some self-regulation on the way content contributions can be made.	Self-regulation as internal process of the resource hosting organisation.	Horizontal communi-cation networks.	Horizontal communication networks; self-regulation as platform management.

H – High, M – Medium, L – Low.
Source: developed by the author

In terms of *participant/group variety*, high demographical, educational and cultural variety of the participants is observed in all platforms and especially in *Sub-Groups 1, 3 and 4*. It is based on *global unrestricted involvement* (for instance, technology enabled equal access for all), in many cases *no threshold requirements for contributors* or the *things they can contribute with* (e.g., content or technical expertise, other skills or competences or just enthusiasm) / users, possibilities to *contribute in different languages*. A good example here is *Wikipedia* and other similar platforms (Sub-Group 1). Wikipedia, for instance, presents itself as "a product of thousands of editors" contributions, each one bringing something different to the table, whether it be: researching skills, technical expertise, writing prowess or tidbits of information, but most importantly a willingness to help"[25]. The resource today, by providing more than four and half million English language articles only, is the largest encyclopedia worldwide. In cases where restrictions on contributing/resource usage are, indeed, necessary (for instance, *Intellipedia*), group variety is compensated through other aspects,

[25] <http://en.wikipedia.org/wiki/Wikipedia:Contributing_to_Wikipedia>.

such as as *wide participation as possible by those eligible for involvement*. Also, there are *many ways to be involved* (using both technological and non-technological (e.g., face-to-face) mediation tools) through *various engagement levels* – from global to local and various specific broad audiences/ target groups – for anybody interested in the subject, students and pupils. An interesting initiative in this respect is *TED*. *TED* is recognized as a global community of people of various ranges of disciplines and cultures to seek a deeper understanding of the world. The most important element of the platform is a global *TED* conference, which is organised twice a year and which for a week gathers to one place about 1,200 of the most interesting and most influential professionals from around the world. According to the platform, the event's ability to attract a large number of the world's best specialists in different fields is one of the main prerequisites for the success of such an initiative as it guarantees unpredictable linkages and unexpected insights as well as a very strong stimulus for new work[26]. Technology-enabled conference presentations are then made available for the global population to use. Independent by the platform supported the so called linked *TEDx* events help to spread the ideas in the local communities around the world. Separate platform initiatives stimulate pupils (*TED-Ed*) and students" (*TED-Ed Clubs*) curiosity and involvement in the initiative activities.

At the end of their first year (2006), *TED* Talks were only watched two million times; by the end of 2009, that number jumped to 200 million, establishing *TED* as an important platform; in November of 2012, *TED Talks* crossed the mark of one billion collective views[27]. Group variety in *Sub-Group 2* CI initiatives (*CAS* and *FIZ Karlsruhe*) is ensured by *linking organisational activities and responsibilities with a team of field experts from all over the world* which would, for example, curate and control the quality of accumulated information resource.

In terms of *group dynamics, Sub-Groups 1 and 3* are mainly based on individual contribution possibilities to the whole, where the ability to contribute and improve "the whole" (*joint individual collaboration*) is the real added value of the involvement. For instance, to date, thousands of people from all over the world have collaboratively written 180,847 how-

[26] TED [interactive]. [accessed on 2014-11-03-]. <http://www.ted.com/about/programs-initiatives/ted-talks>.

[27] TED [interactive]. [accessed on 2014-11-03]. <http://www.ted.com/about/programs-initiatives/ted-talks>.

to articles on *wikiHow*; "people are encouraged to work together to build one high-quality page on a particular topic, rather than each person making their own page"[28]. *GitHub*, in the meantime, is also a good example of online *teamwork*. It is one of the biggest platforms for software developers in the world enabling them to work in collaboration on software development projects, share their knowledge and learn from each other. It enables individuals and organisations to create projects, work on them and to contribute source code to anybody interested in it without an approval or oversight from the original authors[29]. Changes can be committed locally (e.g., on user's desktop) and pulled to the parent repository with a code review. Anyone can comment on any single line of code or request the version for further development. Today, *GitHub* is called a global mind meld or massive file of human knowledge and a social network that has completely changed the way people work[30]. Before *GitHub* existed, major companies created their knowledge mainly privately, but when a user access to his GitHub account, he is free to download, study and build upon anything he adds to the network[31]. *TED* platform (*Sub-Group 4*) demonstrates a number of interesting features within this dimension, such as *teamwork* (for instance, a new product developed by the platform – the so called *TED-Ed Lessons* – video material, which is delivered in an attractive way for pupils about new learning topics and which is being developed jointly by working teams of educators and animators). Each joint work aims at better introducing and developing a new *TED* community proposed teaching topic for the pupils. It can be then tailored to suit the individual needs of educators and pupils.

In terms of impact of *time and location*, this is the dimension, which is important and, because of technology-enabled easy access, is usually full-filled by all CI platforms to enjoy the full benefits that such platforms could offer in overall. For instance, easy access to information *despite time and location* is very important even to platforms with access eligibility requirements, for instance, security-related information system in the U.S.,

[28] WikiHow [interactive]. [accessed on 2014-11-03-]. <http://www.wikihow.com/wikiHow:About-wikiHow>.

[29] dB.dblock.org. *Github is Your New Resume*. <http://code.dblock.org/github-is-your-new-resume>.

[30] Readwrite.com [interactive]. [accessed on 2014-11-03-]. <http://readwrite.com/2013/09/30/understanding-github-a-journey-for-beginners-part-1>.

[31] Readwrite.com [interactive]. [accessed on 2014-11-03-]. <http://readwrite.com/2013/09/30/understanding-github-a-journey-for-beginners-part-1>.

Intellipedia. Users with appropriate clearances from different agencies of the intelligence community can access Intellipedia from remote terminals outside their workspaces via secure networks, in addition to their normal workstations. The system allows information to be assembled and reviewed by a wide variety of sources and agencies, to address concerns "pre-war intelligence did not include into dissenting opinions on Iraq's alleged weapons programs to avoid "decision superiority", instead of "information superiority""[32]. The system was developed by understanding "the real power of the Internet via self-publishing". Sixteen months after its creation, officials noted "that the top-secret version of Intellipedia alone had 29,255 articles, with an average of 114 new articles and more than 6,000 edits to articles added each workday, as of January 2014, the Top Secret Intellipedia had 113,000 content pages with 255,000 users"[33]. Sub-group 3 platforms are also emphasizing "*anytime anywhere access* to professional (legal/medical) information and advice" as benefits that the platforms can offer.

In terms of *anonymity/publicity solutions*, different approaches are applied for content users and content contributors. Almost all Sub-Groups of the platforms may ensure (*full/partial*) *anonymity/do not require registering* of both its users and contributors (for instance, *Wikipedia*); however, this is either discouraged by offering additional benefits for registered users (for instance, access to a greater part of platform content (e.g., *TED*, *Teamliquid*), platform's technical functionalities (e.g., *Git hub*), participation in tournaments (e.g., *Teamliquid*) and similar)) or by the overall business model of the platform that offers broader benefits in exchange of a voluntary refusal of anonymity within the platform (for instance, *Sub-Group 3* platforms). An open use of resources developed (with some exceptions, e.g., *Intellipedia* or *Sub-Group 2* platforms) is typical for almost all knowledge platforms in this Group. Neither of these platforms require logging in nor pay a fee to read or review their materials or even parts of it. This can be explained by an interest to attract as many users of their resources as possible. More conditions surround the ability to contribute content-wise to these platforms, although they are dedicated more for quality assurance and sound more like tips on how to make these contributions more appreciated rather than protecting the ability to contribute to the knowledge pool just

[32] Wikipedia. *Intellipedia* [interactive]. [accessed on 2014-11-03] <http://en.wikipedia.org/wiki/Intellipedia>.

[33] *Ibid.*

for a few people, for instance, *Wikipedia* states that "nobody owns articles, so if you see a problem that you can fix, do so. Everyone is encouraged to copyedit articles, add content and create new articles if they have knowledge about the topic at hand or are willing to do the necessary research to improve it"[34]. For a similar reason, users do not have to log in even to edit articles on Wikipedia, although creating an account is associated with certain benefits, for instance, it is free, opens an ability to create pages, upload media and edit without one's IP address being visible to the public. Some pages are protected from direct editing due to avoiding misconduct in relation to sensitive information. Similar approaches are applied for virtual community members of other platforms of this kind. In the meantime, for the registered users of *HealthTap* platform, additional functionalities are available, such as free of charge personalized health tips, answers to medical questions on the subject, personalized health plans to improve individual's health and well-being. Platform members receive 24/7 access to the most qualified physicians using high definition video, voice or chat technology.

In terms of *idea generation methods*, the type they are used in particular platforms reflect the specific needs of the platform in question. The majority of *Sub-Group 1* platforms rely on *information exchange* and *discussion*; however, more sophisticated idea generation methods are used within the platform *TeamLiquid* of the same Sub-Group, such as *information exchange*, *discussion*, *offline workshops* and *meetings*, *voting*, *game* and *contest generated knowledge*. Here, game enthusiasts will find everything they need to know about professional game scenes, including pro-gaming news and information, videos, strategies, and replays[35]. The platform maintains a *Wiki* called *Liquipedia* chock full of information for various game scenes, a database of every professional *StarCraft* game ever played in the *Teamliquid Programming Database* (TLPD), extensive news coverage of various events and a very active forum of users from all over the world. The company was founded in 2002 and by now the platform has grown into the largest computer game communities on the Internet. Today, the platform receives over two million unique visitors each month and has become more than just a news and message board: it runs its

[34] Wikipedia. *Contributing to Wikipedia* [interactive]. [accessed on 2014-11-03-]. <http://en.wikipedia.org/wiki/Wikipedia:Contributing_to_Wikipedia>.

[35] TeamLiquid [interactive]. [accessed on 2014-11-03-]. <http://www.teamliquid.net/about/>.

own tournaments, such as the $25,000+ prize pool TSL, and other live programs, such as Liquibition exhibition matches and "TL: Attack!", where pros chat and play with TL members. The site also functions as a central hub for tournaments, events, and offline meet-ups. Other Sub-Groups also use a broad spectrum of idea generation methods just specified.

In terms of *strategic decision-making*, this group of CI platforms does not extensively use strategic decision-making tools because of their areas of engagement.

In terms of *group size/critical mass*, for all the analysed Sub-Group platforms, group size/critical mass is an essential element of their effective operation. Moreover, the group size is usually linked to the business model of one or another platform and, therefore, as wide participation as possible is encouraged by applying various motivation strategies and tools. Taking into consideration that this might also cause challenges, various strategies are used by the platforms to offer different participation levels and ways and, therefore, manage the whole group size. For instance, *Wikipedia* as a free-access and free content encyclopedia that anyone can edit at any time is now a much-used resource – it is sixth-most popular website on the Internet with 18 billion page views and nearly 500 million unique visitors each month[36]. There are many ways that the platforms use to acknowledge the work by those that voluntary contribute to the development of online platform resources. In addition, each contribution can be rated or discussed. In terms of "critical mass" of contributors within these communities to reach "swarm effect", an interesting outcome is delivered by *GitHub*: with around 3.4 million users at the beginning of 2014 and over 16.3 million so called repositories (a directory or storage space where projects can live), GitHub has become such a staple among the open-source development community that many developers have begun considering it a replacement for a conventional resume (CV), and some employers require applicants to provide a link to and have an active contributing *GitHub* account in order to qualify for a job[37]. A unique approach in this respect has been developed by *Avvo* (wide participation is linked to the business model of the platform and includes such interesting aspects as business development

[36] Wikipedia (EN) [interactive]. [accessed on 2014-11-06-]. <http://en.wikipedia.org/wiki/Wikipedia:Contributing_to_Wikipedia>.

[37] dB.dblock.org. *Github is Your New Resume* [interactive]. [accessed on 2014-11-06-]. <http://code.dblock.org/github-is-your-new-resume>.

and reputation building). Today, the platform contains detailed profiles of almost 97% practicing lawyers in the U.S. with their *Avvo* rankings, feedback from the clients, peer comments and other information. Platform users can free of charge browse the lawyers' directory to find the lawyer that would best correspond to their individual needs as well as to get free of charge legal advice from the best U.S. lawyers within 12 hours from the request. For instance, within the last week only, there were 25 379 answers to free of charge legal advice requests provided by 2 848 lawyers, key word search can be undertaken from about 3 million answers to legal questions, there are about 600 000 feedback comments from the clients and peers, the platform ranks almost 97% of all U.S. lawyers[38]. Lawyers, in the meantime, use this platform extensively for business development purposes.

In terms of *self-regulation*, the majority of the analysed platforms of this Group rely on horizontal communication networks with some self-regulation to be effective as a knowledge platform.

Decision-making/problem-solving

General Group 2 review. The second group of Collective Intelligence platforms is assigned to the "Decision-making/Problem-solving" category relying on collective knowledge through open innovation processes. CI as an enabler for more informed decision-making and problem-solving offers one of the greatest spectrum of various CI initiatives and platforms. According to Leimeister, it refers to the opening of companies' innovation processes by actively integrating the knowledge of internal (e.g., employees) and external (clients, suppliers, other potential stakeholders) environments into these activities and, thus, extending its innovation capabilities for developing new products and services for wider areas of application[39]. It is convenient for the companies as they can generate collective knowledge for their innovation processes at different stages of product or service development.

As in the first group, several sub-groups with common features and particularities are identified (Table 9). The first Sub-group in this category relies on collective knowledge in *decision support*. The second Sub-group of CI platforms gives a number of examples of individual open innovation solutions, which are used by large multi-national companies as additional possibilities to generate *business knowledge* (*collaborative creation*/

[38] Avvo [interactive]. [accessed on 2014-11-06-]. <http://www.avvo.com/>.
[39] Leimeister, J.M. Kollektive Intelligenz. *Wirtschaftsinformatik*. Gabler Verlag, 2010.

collaborative design markets). The third Sub-group includes examples of platforms where CI is generated through collaboration/co-creation of innovation. Sometimes, this type of CI platforms is called community-based invention engines or *social ideation*. The fourth Sub-group contains examples of crowdsourcing problem-solving. Idea contests are assigned to Sub-group 5. Crowdsourcing as outsourcing or virtual marketplace, which includes examples of virtual labour marketplaces and a collaborative design market (videocrowdsourcing), are grouped to the Sub-group 6. Sub-group 7 contains an example of gamification as a CI form in stimulating CI in a company. The last sub-group (Sub-group 8) presents various platforms offering mediation services and tools for CI.

Table 9. CI platforms: Group 2: Decision-making/problem-solving

Sub-Group of CI platforms	Examples	The main objective of the platform	Origin/ coverage	Main users/ platform participants
1. *Collection creation*/ Decision support	The Millennium Project (http://www.millennium-project.org/ and www.themp.org)	This is an initiative aiming at connecting futurists from all over the world to improve the quality of future forecast studies and research as well as the dissemination of results to enable more informed decision-making.	Global	Futurists, scholars, business planners, and policy makers who work for international organizations, governments, corporations, NGOs and universities.
2. Open innovation as business knowledge (collaborative creation)	The Lego Digital Designer (http://ldd.lego.com/en-us/	To enable the company customers to build their own Lego models using virtual Lego bricks.	One company; international coverage	Anybody interested in Lego (parents, children, educators, etc.).
	"Customer innovation labs" of large corporations, for instance, BMW Group Co-Creation Lab (https://www.bmwgroup-cocreationlab.com), IBM (https://www.collaborationjam.com/), etc.	Engaging with and learning from lead-user consumers.	Large corporations; international coverage	Anybody, especially lead-user consumers.

3. Collaborative/ co-creation of innovation/ community-based invention engine/social ideation	Quirky (https://www.quirky.com/)	To materialise the best product ideas submitted by the public.	U.S.; global	Anybody (idea submitters, inventors, idea voters, industry experts, community members, influencers at any stage of the idea development, e.g., design, enhance, style, name, tagline, price, etc., Quirky's Manufacturing team, etc.).
	AHHHA (http://ahhha.com/)	It is a crowdsourcing site where innovators and contributors cooperatively develop new ideas into commercial products.	Global	Anybody
	Ycombinator (http://www.ycombinator.com/)	To provide seed funding for start-ups by working with them on their ideas and helping dealing with investors and acquirers.	U.S.; global	Anybody
4. Crowdsourcing for problem-solving/ intelligent crowdsourcing	InnoCentive (https://www.innocentive.com/)	Crowdsourcing innovation problems on business, social, policy, scientific and technical challenges.	Global	Anybody (solution seekers, problem solvers, etc.).
	Hypios (http://www.hypios.com/)	To help corporations meet specific R&D needs.	France; global	Anybody (solution seekers, problem solvers, etc.).
	Topcoder (http://www.topcoder.com)	To provide companies with crowdsourcing solutions in design, development and data science.	Global	Experts in design, development and data science; companies, etc.

5. Creativity and new idea generation: idea contests with backup support/" social think-tank"	Idea Bounty (http://www.ideabounty.com/)	A crowdsourcing platform that allows solution seekers to ask for creative ideas in exchange for a reward.	Global	Individuals, companies.
	eYeka (https://en.eyeka.com/)			
	Zooppa (http://zooppa.com/en-us)			
6. Crowd-sourcing as outsourcing/ Virtual (Labour) Marketplace	Amazon's Mechanical Turk (http://www.mturk. com/)	To enable individuals and businesses to coordinate the use of human intelligence to perform tasks that computers are currently unable to do.	Global	Anybody (individuals, companies, etc.).
	Clickworkers (http://www.clickworker.com/en/)		Global	Anybody (individuals, companies, etc.).
	Kaggle (http://www.kaggle.com/)	Community of data scientists.	Global	Anybody (individuals, companies, etc.).
7. Collaborative design markets (videocrowd-sourcing)	Userfarm(https://www.userfarm.com/)	To give clients the opportunity to connect with 75.000+ filmmakers' community and get a faster access to video production.	Italy; global	Worldwide community of over 75.000 videomakers, producers and animators; companies, etc.
Tools/Intermediary support for open innovation				
NineSigma (http://www.ninesigma.com/)		To connect innovation-seeking companies with the global innovation community to get science and technology solutions.		
Mindjet (http://www.mindjet.com/)		To provide the capabilities to companies to innovate at scale.		
Ideaken (http://www.ideaken.com/)		To provide a platform and services which enable Crowdsourcing for ideas and solutions.		
CogniStreamer (http://www.cognistreamer.com/)		To offer solutions to large companies to facilitate more efficient internal collaboration in groups.		
Lumenogic (http://www.lumenogic.com/)		To provide crowdsourcing tools to companies to benefit from CI of their employees or customers.		
Imaginatik (http://imaginatik.com/)		To provide innovation software.		
Wellspring (http://www.wellspring.com/)		To provide software infrastructure to identify and capture value from customers' Knowledge Supply Chains.		
Jovoto (http://www.jovoto.com/)		To help companies create better products graphic designer, architect, industrial designer, copywriter or any creative field.		

Chaordix (http://www.chaordix.com/)	To provide a software platform for companies to benefit from consumers insights. A marketplace of technology offers and requests.
yet2.com (http://www.yet2.com/)	
Innoget (http://www.innoget.com/)	

Source: developed by the author

Collective Intelligence initiatives and platforms offer great potential for decision support. First of all, it should be noted that almost every initiative in open innovation category in one or another way contributes to better decision-making process and, therefore, has an element of decision support. This type of CI offers great potential in cases requiring accumulation or processing of big data and various types of artefacts. *The Millennium Project* in Sub-group 1 is a good example in the field of global foresight. The initiative aims at connecting futurists from all over the world to improve the quality of future forecast studies and research[40].

Today, open innovation business models are considered as providing great tools and new possibilities for capturing customer knowledge and, therefore, are essential for companies' survival in today's global markets where needs are changing on an ongoing basis, nothing to say about the companies and other economic entities which want to lead innovations in their area. Companies use various approaches and strategies on customer integration activities into innovation processes to reap the full potential for improving their creativity and innovation capabilities and a number of collaborative creation examples illustrate the great variety of them. Sub-group 2 examples are well-established companies, such as *BMW*, *LEGO*, *IBM* and many others, which purposefully use the creativity of the collective for designing innovative products and services. *BMW*, for instance, runs customer innovation lab – the so called *BMW Group Co-Creation Lab* – a virtual meeting place for individuals interested in cars and all related topics, who want to share their ideas and opinions on tomorrow's automotive world with *BMW Group car manufacturers*[41]. *LEGO*, for example, also uses the help of its customers to advance its products: *The Lego Digital Designer* provides a toolkit for users for designing individual product models[42]. *IBM*, in the meantime, operates

[40] About the Millennium Project [interactive]. [accessed on 2014-11-06-]. <http://www.millennium-project.org/millennium/overview.html>.

[41] Abount BMW Group Co-Creation Lab [interactive]. [accessed on 2014-11-06]. <https://www.bmwgroup-cocreationlab.com/about>.

[42] LEGO Group [interactive]. [accessed on 2014-11-06-]. <http://ldd.lego.com>.

Jams and other Web 2.0 collaborative mediums and, according to the company, the tools are opening up tremendous possibilities for collaborative innovation — ways of working across industries, disciplines and national borders: "in a world where innovation is global, multidisciplinary and open, you need to bring different minds and different perspectives together to discover new solutions to long-standing problems"[43].

Sub-group 3 demonstrates three examples of collaboration/co-creation of innovation or *social ideation*. The general approach of the so called "social product development" platforms involves submission of invention ideas suggestions by the users of the platform; a public review and voting of the submitted ideas by the rest of the invention community; the invention ideas that make it through the evaluation process are then refined and elaborated using in-house product development teams of the platforms and, if they are able then to generate enough retailer interest, the platform brings the product to market in partnership with the original inventor[44]. *AHHHA* is one of the crowdsourcing sites where innovators and contributors cooperatively develop new ideas into commercial products. A very similar platform – *Quirky* – is called today as a consumer product company, which is transforming manufacturing by letting consumers decide what gets produced[45]. *Ycombinator* platform provides seed funding for start-ups and assigns to each of them a team of experts to work with the companies on every stage of the elaboration of their ideas, including the help in dealing with potential investors and acquirers.

A number of platforms can be attributed to the group of initiatives that aim at crowdsourcing for problem-solving (Sub-group 4). *InnoCentive*, for example, is among the global leaders in crowdsourcing innovation problems to a global audience of potential problem solvers in dealing with business, social, policy, scientific and technical challenges. A very similar approach is used by *Hypios*, a platform that was created to help corporations meet specific R&D needs. An additional benefit it provides is that it combines intelligent competency discovery technology and human outreach to deliver an open problem-solving service by the so called "intelligent crowdsourcing". The *Topcoder* community gathers the world's

[43] IBM Collaboration Jam [interactive]. [accessed on 2014-11-06-]. <https://www.collaborationjam.com/>.

[44] Quirky [interactive]. [accessed on 2014-11-06-]. <https://www.quirky.com/how-it-works>.

[45] *Ibid*.

experts in design, development and data science to work on interesting and challenging problems for fun and/or reward.

A number of platforms (Sub-group 5) focus on crowd-sourcing idea contests, for instance, *Idea Bounty* is a website that allows clients to ask the world for creative ideas in exchange for a reward, or *Bounty*[46]. Other two platforms focus on a full spectrum of services in relation to creative design, advertising industry and others (includes working from strategy insights to producing print campaigns, from social media campaigns to TV commercials, etc.). *eYeka* platform comes with a similar approach, but, with additional support, once creators' suggestions are received, a team of experienced co-creation planners help to stimulate greater response and give the client additional thinking and ideas together with an actionable solution[47]. The platform also helps its creative community to improve their creative skills, work with the biggest global brands and their agencies and get rewarded for creating high quality content and ideas. *Zooppa*, in the meantime, calls itself as a global social network for creative talent that partners with brands and agencies to launch user-generated advertising campaigns[48]. The platform hosts brand sponsored advertising contests in competition for cash prizes, filmmakers, graphic designers and other creators to submit their original ads (including video, print, banners, concepts and audio, etc.).

Sub-group 6 includes a number of examples of crowdsourcing as outsourcing or *virtual collaborative* marketplaces. Another group of CI initiatives can be assigned to examples that demonstrate crowdsourcing as outsourcing. According to Howe, the term "crowdsourcing" is based on the concept of outsourcing and it has emerged referring to the outsourcing of corporate activities to an independent mass of people ("crowd")[49]. A number of CI initiatives can be singled out to show the diversity of available CI platforms in this field and, in fact, sub-grouped into a number of types of initiatives under this category of CI. *The Amazon Mechanical Turk* (MTurk), *Clickworkers* and *Kaggle* are crowdsourcing *Internet labour marketplaces* that enable individuals and businesses (known as requesters) to coordinate the use of human intelligence to perform tasks that computers are currently unable to do (for instance, if somebody has or

[46] IdeaBounty [interactive]. [accessed on 2014-11-06-]. <http://www.ideabounty.com/faq>.
[47] Eyeka [interactive]. [accessed on 2014-11-06-]. <https://en.eyeka.com/overview>.
[48] Zooppa [interactive]. [accessed on 2014-11-06-]. <http://zooppa.com/en-us>.
[49] Leimeister, J. M. Collective Intelligence. *Business & Information Systems Engineering*. 2010, 2(4).

needs quantities of unstructured data, such as text, photos or videos) or the cost of programming or equipment is too high or there is a lack of human resources to complete the project on time and on budget[50]. They connect individuals and businesses with on demand virtual workforce/independent contractors for a temporal cooperation on specific tasks. For instance, *Kaggle* platform is a large online community of data scientists. Community members compete with each other to solve complex data science problems, and the top competitors are invited to work on the most interesting and sensitive business problems from some of the world's biggest companies through Masters competitions[51]. *Userfarm* is an example of a collaborative design market (videocrowdsourcing) where a growing community of filmmakers and creators assisted by skilled and experienced platform professionals (such as sales managers, project managers, creative strategists, IT developers and crowdsourcing managers, etc.) work together to deliver the best and most challenging video projects for the clients.

Below, all these sub-groups are analysed by CI indicators.

Analysing Group 2 by CI indicators

Table 10. Group 2: Social collaboration analysis by CI indicators

CI Indicators	Sub-Group 1	Sub-Groups 2/4	Sub-Groups 5/6	Sub-Group 3
Participant/ group variety (demographic, educational, cultural, etc.).	H; operate through global networks of individuals and institutions that connect global and local views; usually involves a specific community of practice (field experts); use of both technological and non-technological mediums; many ways to contribute; jointly developed resources.	H; online co-creation labs to engage with lead-user consumers; various ways to contribute, contests, financial remuneration.	H; online co-creation labs to engage with lead-user consumers; various ways to contribute, contests, financial remuneration.	H; various ways to contribute, contests, financial remuneration.

[50] Wikipedia. Amazon's Mechanical Turk [interactive]. [accessed on 2014-10-05-]. <http://en.wikipedia.org/wiki/Amazon_Mechanical_Turk>; Clickworkers [interactive]. [accessed on 2014-10-05-]. <http://www.clickworker.com/en/das-clickworker-prinzip/>.

[51] Kaggle [interactive]. [accessed on 2014-10-05-]. <http://www.kaggle.com/about>.

Group dynamics (teamwork (virtual access, off-line collaboration, anonymity, team management, etc.) / individual participation in the group)	H; virtual access, global and local networks of experts; different ways of engagement; off-line collaboration.	Teamwork as an outcome of individual crowd contributions (individual participation in a group).	Teamwork as an outcome of individual crowd contributions (individual participation in a group).	All community voting on submitted ideas; individual participation in the group; working along in the group; tools for recognising individual contribution; financial remuneration.
Impact of time and location (anytime, anywhere)	Ability to access and contribute anytime from anywhere.	Ability to access and contribute anytime from anywhere.	Ability to access and contribute anytime from anywhere.	Ability to access and contribute anytime from anywhere.
Anonymity (full/partial anonymity, use of nicknames etc.) / publicity solutions	(Paid/) subscription access to resources and additional possibilities.	Registration required; additional conditions not only for contributors, but also for users.	Registration required; additional conditions not only for contributors, but also for users.	Registration required; additional conditions not only for contributors, but also for users.
Idea generation methods	Information exchange, discussion, offline workshops and meetings, communities of practice interaction.	2/4: information exchange, discussion, brainstorming, voting, contest, collaborative market generated knowledge.	5: contest, brainstorming, voting, collaborative market generated knowledge. 6: collaborative market generated knowledge, information exchange, communities of practice interaction; brainstorming, contest.	Brainstorming, voting, information exchange, discussion, communities of practice interaction; contest.

Strategic decision-making (problem-solving idea generation/ decision to act)	Depends on the issue: by the entire community of practice (usually idea generation); decision-making: the Board, operational committee and secretariat of an organisation/project.	Depends on the issue: by the entire community (usually idea generation); decision-making: by the platform "owners", platform administrators or platform board.	Depends on the issue: by the entire community (usually idea generation); decision-making: by the platform "owners", platform administrators or platform board.	Depends on the issue: by the entire community (usually idea generation); decision-making: by the platform "owners", platform administrators or platform board.
Group size/ critical mass	Critical importance	Critical importance	Critical importance	Critical importance
Self-regulation (structural decision-making, leadership, conflict management), crowd vs hierarchy	Depends on the issue, but usually by the platform "owners", platform administrators or platform board.	Depends on the issue, but usually by the platform "owners", platform administrators or platform board.	Depends on the issue, but usually by the platform "owners", platform administrators or platform board.	Depends on the issue, but usually by the platform "owners", platform administrators or platform board.

H – High, M – Medium, L – Low.
Source: developed by the author

In terms of *participant/group variety* and *group size/critical mass*, all sub-group platforms demonstrate a great variety of its participants and group size/critical mass is among the critical factors that all CI platforms rely on and this group of CI examples is not an exception. In fact, both factors are among the main pre-conditions of every CI platform to succeed. For instance, *The Millennium Project* organises consistent and cumulative process of collecting and assessing opinions of about 3500 well-known subject experts from about 50 strongest research centers in the world. Open innovation platforms that are usually run by large multi-national companies (Sub-group 2) stimulate as wide participation as possible of, as they usually call them, co-creators of innovative products and services, by using various means. For instance, some companies invite the contributors from all over the world not only to evaluate concepts or specific topics, which are developed by the companies themselves, but also actively contribute their

own ideas and suggestions; once registered, users may join the co called co-creators communities, may look through the past and currently running projects, actively contribute, discuss, participate in contests and other activities of the platform (for instance, *BMW Group Co-Creation Lab*). In addition to toolkit for users enabling them to design individual product models, the *LEGO* platform offers the so called *LEGO Club*, *Galleries* (where users can view what other *LEGO* fans are building), Message boards (where fans can pick a forum they like and start chatting), etc. to advance user engagement[52]. The company has recently launched *My LEGO Network* – a new social networking site for children to offer them a safe environment for a "virtual playground" where they could collect, build and trade virtual items with each other[53]. Using its collaborative medium, *IBM*, for instance, regularly involves its more than 300,000 employees around the world in far-reaching exploration and problem-solving. During one of its online innovation brainstorming sessions, the company has brought together more than 150,000 people from 104 countries and 67 companies and, as a result, 10 new IBM businesses were launched with seed investment total of $100 million[54]. Social ideation platforms (Sub-group 3) also rely on the numbers and variety of their participants: larger and more diverse numbers contribute with more invention ideas. For instance, according to *Quirky* platform, an average product gets an input from around 1,000 people: somebody submits an invention idea, some of these people are just picking colours; some are naming products, etc. and each contribution gets its acknowledgement in the final product[55] (see section about the motivation). All platforms offering solutions of crowdsourcing for problem-solving (Sub-group 4) emphasise the ability of their technological solutions to engage large and diverse innovation communities, such as clients, employees, partners, customers or other possible stakeholder groups, to help the companies/other (non-commercial) organisations by harnessing the power and diversity of crowds to rapidly generate novel ideas and solve most pressing problems for very

[52] The Lego Digital Designer [interactive]. [accessed on 2014-10-05]. <http://ldd.lego.com>.

[53] *Ibid*.

[54] CollaborationJam [interactive]. [accessed on 2014-10-05-]. <https://www.collaborationjam.com/>.

[55] Forbes. *Don't Call It Crowdsourcing: Quirky CEO Ben Kaufman Brings Invention to the Masses*. 2012 [interactive]. [accessed on 2014-10-05-]. <http://www.forbes.com/sites/techonomy/2012/04/23/dont-call-it-crowdsourcing-quirky-ceo-ben-kaufman-brings-invention-to-the-masses/>.

similar reasons such CI platforms like contests (Sub-group 5) and virtual marketplaces (Sub-group 6).

In terms of *group dynamics*, all Sub-groups in this grouping of CI initiatives emphasise the collective through individual contributions, although teamwork is a "cross-cutting" activity in all the analysed platforms. For instance, Sub-group 1 example relies on individual expert contributions of a global field expert network, but the insights are integrated within a wider pool of knowledge of local communities of practice via joint events and other (e.g., research) activities; therefore, work in groups (teams) is important here. The more so because later all work is systemised and results are presented in annual research papers "State of the Future" and "Futures Research Methodology", a number of specialized issues are published in the Global Futures Intelligence System on the community platform. Sub-groups 2/4/6/5 also rely on individual contributions (open innovation as business knowledge, problem-solving, virtual marketplaces, idea contests) as the first step; however, then the final outcome is usually generated through the teamwork. For instance, before 2012, *LEGO* operated the so called "Design by Me" individually designed model delivery service, where a team of company specialists could produce any module which was designed by anybody from their customers using free of charge *LEGO Digital Designer* software programme available on the company's website. *Virtual Labour markets* also seek individual contributions of a "crowd". Ideation platforms (Sub-group 3), for instance, *Quirky*, clearly recognise that besides the original inventor and their in-house product development team, there are thousands of contributors (called "influencers" by the platform) which have helped the product to reach the shelf: "an average product gets input from around 1,000 people. Every time one unit of this thing sells, 1,000 people get paid. "If you look at the packaging on all our stuff, we literally list all their names". "We got this Red Dot Design Award last week and we sent them a list of 2,400 names". "We get an invention idea, we are elaborating it, feeding the community designs; they're responding to them. They're feeding us ideas; we're feeding them expertise. It's much more of a conversation, a collaboration, or co-creation it is about mass customization"".[56]. It is also

[56] Forbes. *Don't Call It Crowdsourcing: Quirky CEO Ben Kaufman Brings Invention to the Masses*. 2012 [interactive]. [accessed on 2014-10-05-]. <http://www.forbes.com/sites/techonomy/2012/04/23/dont-call-it-crowdsourcing-quirky-ceo-ben-kaufman-brings-invention-to-the-masses/>.

important to draw attention to the fact that these types of platforms have developed tools enabling them to track down to a fraction of a percentage how impactful each and every community member was over the entire process of a successful development of the product (*Quirky*, for instance).

In terms of impact of *time and location*, all platform sub-groups rely on technology-enabled "anytime/anywhere" access.

In terms of *anonymity/publicity solutions*, platform registration is required to access a greater part of resources (for instance, *The Millennium Project*)/more sophisticated platform tools or additional possibilities. The required registration information ranges from very basic (account information and a user name) to a very extensive one (for instance, *BMW Group Co-Creation Lab*), such as an account information, very detailed personal information (e.g., name, surname, date of birth, occupation, family status, place of residence, yearly income, education qualification), declaration of reasons to participate, car information and some additional information that, according to the company, would enable them to identify projects that might be of special individual interest. By willing to contribute to the social ideation (Sub-group 3) platforms, one has to full-fill additional conditions, for instance, *AHHHA* once registered puts you on the innovators "waiting list" (with 240 thousands ahead of you) where priority access will be gained as many of your referred friends join the platform or through a paid access. Problem-solving, idea contest and virtual marketplace platforms (Sub-group 4/5/6) also require registering to submit or access the challenges.

In terms of *idea generation methods*, there is a broad spectrum of them used by various platforms. Common trends suggest that Sub-group 1 (knowledge accumulation) platforms, such as *The Millennium Project,* usually rely on information exchange, discussion, offline workshops and meetings, communities of practice interaction. Sub-groups 2/4 rely on information exchange, discussion, brainstorming, voting, contest, collaborative market generated knowledge. Brainstorming, voting, information exchange, discussion, communities of practice interaction and contests are the methods most often relied on by Sub-group 3 (social ideation). Idea contests (Sub-group 5) usually use contests, brainstorming, voting and collaborative market generated knowledge. Gamification platforms usually use information exchange, discussion, offline workshops and meetings, brainstorming, voting and contests to satisfy their needs.

In terms of *strategic decision-making*, it depends on the issue. In the majority of cases of this group CI initiatives, the decision-making power rest with platform "owners", platform administrators or a kind of a platform board.

As regarding the strategic decision-making, *self-regulation* usually rests within platform "owners", platform administrators or platform board, too.

Social collaboration and Life-long learning/learning organisation

General Group 3 and Group 4 reviews. The third group of the platforms is assigned to the group "Social collaboration" (see Table 11). The first Sub-group of this group of platforms is assigned to "*Content sharing*". Content sharing platforms enable users to collect, store, manage and share contents, such as photos, videos, bookmarks and similar. Here, cross-references and categories are supported through tags that enable other users to better understand the user generated content. Sub-group 2 contains a number of examples in the area of Civic Engagement.

The fourth group of the platforms is categorised to the topic "Life-long learning/learning organisation". This group is divided into two Sub-groups: Sub-group 1 Massive Open Online Course (MOOP) and Sub-group 2 Gamification.

Table 11. CI platforms: Group 3: Social collaboration and Group 4: Life-long learning/learning organisation

Sub-Group of CI platforms	Examples	The main objective of the platform	Origin/ coverage	Main users/platform participants
Group 3. Social collaboration				
1. Content sharing	Digital Photography Review (http://www.dpreview.com)	To provide authoritative reviews, news reports and one of most comprehensive databases of consumer digital cameras in the world.	Global	Anybody
	Youtube (https://www.youtube.com	It allows billions of people discovering, watching and sharing originally-created videos.	Global	Anybody
	Shutterstock (http://www.shutterstock.com/)	It is one of the biggest providers of digital royalty-free imagery in the world.	Global	Anybody

	Reddit (http://www.reddit.com)	It provides entertainment, social networking service and news website for community members.	Global	Anybody
	W3C (http://www.w3.org/community)	It is an open forum, without fees, where Web developers and other stakeholders develop specifications, hold discussions, develop test suites and connect with W3C's international community of Web experts.	Global	Anybody
	Pinterest (http://www.pinterest.com)	It is a web and mobile application platform that offers a visual discovery, collection, sharing and storage tool.	Global	Anybody
2. Civic engagement (/participatory democracy)	Beautiful PB. Creating a Sustainable Beautiful Pacific Beach (http://beautifulpb.com/)	It is a local stakeholder engagement platform.	U.S.	Any resident of that local area, companies, public organisations, local government organisations and other stakeholders.
	Connect Lemon Grove (http://www.connect-lemongrove.com)		U.S.	Any resident of that local area, companies, public organisations, local government organisations and other stakeholders.
	Pirate Parties around Europe	Pirate parties support civil rights, direct democracy and participation in government, reform of copyright and patent law, free sharing of knowledge (open content), information privacy, transparency, freedom of information and network neutrality[57].	A number of European countries (Austria, Germany, Sweden, Czech Republic and Iceland).	Anybody

[57] <http://en.wikipedia.org/wiki/Pirate_Party>.

	Discue (http://www.discue.com/)	It is an online communication platform using live video forum with the help of broadcasting video technology to allow people interacting in a way of "many-to-many communication" approach.	Denmark; global	Anybody
2. Civic engagement (/social innovation)	OpenIDEO (https://openideo.com/)	A social innovation platform helping to implement exciting ideas of social change.	UK; global	Anybody
	One Billion Minds (http://www.onebillionminds.com/)	A social innovation platform aiming at generating elaborative and action-based ideation process and a pool of expertise around social innovation projects and ideas.	India; global	Anybody
2. Civic engagement (/crisis management)	Ushahidi (http://ushahidi.com)	Crisis management online platform. Platform's roots are in the collaboration of Kenyan citizen journalists during a time of crisis. The original website was used to map incidents of violence and peace efforts throughout the country based on reports submitted via the web and mobile phones.	Kenya; Global	Anybody
Group 4. Life-long learning/learning organisation				
1. Massive Open Online Course (MOOP)	Edx (https://www.edx.org) Coursera (https://www.coursera.org/) Udacity (https://www.udacity.com/)	To provide universal access to the world's best education.	U.S.; global	Anybody
2. Creativity and new idea generation: gamification	Venture Spirit (http://www.venturespirit.com)	To leverage gamification for the purpose of internal company innovation management. It offers a gaming format to address main business challenges.	Belgium; global	Companies; other organisations

Source: developed by the author

Digital Photography Review, for example, aims to provide the most authoritative reviews, the fastest, fullest news reports and the most comprehensive database of consumer digital cameras in the world and to provide an open, active forum and useful tools for its community[58]. *Digital Photography Review* was founded in December 1998 and over the years has grown to include a vast digital camera database, timeline, forum, image sample galleries, a glossary and articles section, lens, printer and software reviews, user galleries, photo challenges and much more. Today, DPReview is considered being one of the world's most popular dedicated enthusiast digital photography site. The platform believes in original and unbiased content with as much detail as possible. *YouTube* allows billions of people discovering, watching and sharing originally-created videos. In addition, it provides a forum for people to connect, inform and inspire others across the globe and acts as a distribution platform for original content creators and advertisers. *Shutterstock* is one of the biggest providers of digital royalty-free imagery in the world. Their mission is to connect creative business professionals with the best photos, vectors, illustrations and video from thousands of contributors around the world. Today, there are 43,305,923 royalty-free stock images, of which around 298,357 new stock images were added in the last week. *Reddit* provides entertainment, social networking service and news website where registered community members can submit content, then registered users can vote submissions "up" or "down" to organize the posts and determine their position on the site's pages. Content entries are organized by areas of interest, which, for instance, include well-known discussion-based sub-groups, such as *AskReddit*, *IAmA* and others. *W3C* initiative empowers communities around a Web technology. *W3C* has created Community Groups and Business Groups so that developers, designers and anyone passionate about the Web has a place to have discussions and publish documents. *Pinterest* is a web and mobile application platform that offers a visual discovery, collection, sharing, and storage tool. It acts as a personalized media platform where users can upload, save, sort, manage and share images and other media content (e.g., videos and images).

The second sub-group of CI platforms in this area offers many potential for more effective civic participation and democratisation processes via

[58] Digital Photography Review [interactive]. [accessed on 2014-12-20-]. <http://www.dpreview.com/>.

e-participation as this relates to new public sector management concepts, such as good governance, co-creation of public services and similar. Examples include a number of initiatives, such as local community projects like *Beautiful PB. Creating a Sustainable Beautiful Pacific Beach), Connect Lemon Grove*, national (for instance, *Pirate Parties around Europe*) and global initiatives, such as *Discue*, etc. The first three examples demonstrate initiatives that are linked to specific geographical location and demonstrate robust examples of local community engagement in dealing with local residence issues, participating in local community initiatives and decision-making process. A very robust and interesting initiative in this respect is *Beautiful PB.* Creating a *Sustainable Beautiful Pacific Beach in the South of California* in the US. The platform has been developed under the initiative of one local community to connect active residents of that Pacific coastal area in California with local businesses, property owners and other stakeholders for a joint working and collaboration initiative to actively participate and contribute to better decision-making concerning the residential living environment. In the beginning, the technology mediated tool and the initiative in overall was aiming to active contribution towards the development of region's sustainable development strategy and the action plan, which at the same time would correspond to the residential expectations, strengthen the local economy, contribute towards the improvement of business environment and the improvement of community living and visitors" experience. A very similar project which uses the same interactive collaboration and decision-making tool is the project called *Connect Lemon Grove*. Another interesting example of CI in political participation processes at the national/federal (but not limited to) level are *Pirate Parties* across Europe and their *Liquid Democracy* tool they use for this purpose. Originally founded to oppose the lobbyism of anti-piracy groups around Europe, representatives of the *Pirate Parties* today are active members in the national political arenas in Austria, Germany, Sweden, Czech Republic and Iceland. They are active supporters of civil rights, direct democracy and participation in government, reform of copyright and patent law, free sharing of knowledge (open content), information privacy, transparency, freedom of information and network neutrality. A very recent initiative that is aiming at empowering suppressed or weak voices around the globe is called *Discue* (http://www.discue.com/) – one of the "participatory democracy" platform examples. One of the main

objectives of the platform is to empower the voice of a global community of suppressed or weak voices which for a variety of reasons are not heard in the mainstream media or/and other public information spaces and who wish to discuss the topics on painful social issues, or, in other words, to create a platform for freedom of speech for all those who, according to the quote of George Orwell, are not among the "more equal of equals". *OpenIDEO*, in the meantime, is a global-reach platform of social innovation, aiming at shared collaboration in solving social problems together. For instance, the site's first challenge was getting more people involved in British chef Jamie Oliver's "Food Revolution" online. In hosting this challenge, *OpenIDEO* supported Oliver in fulfilling his 2010 TED prize wish list[59]. Another open social innovation platform, *One Billion Minds*, aims to connect the "owners" of an innovative social project or an idea with anybody who would be willing and able to help elaborating and implementing it in combining arts, science, technology and design. Particular attention is paid to Students and Alumni of top universities. Ushahidi (http://ushahidi.com/) is a non-profit tech company that specializes in developing free and open source software for information collection, visualization and interactive mapping and is often used for crisis management purposes.

In the group of Life-long learning/learning organisation platforms, one group is dedicated to the growing field of initiatives – the education platforms offering *massive open online courses* (MOOC) to anybody interested in lifelong learning possibilities, for instance, *Edx platform* offers free of charge interactive online learning courses of an individual choice, which are offered by the best universities in the world (for instance, the Massachusetts Institute of Technology, Harvard and Berkeley) using mooc.org learning environment. Broad-themed courses are prepared by the world's best university lecturers and integrate most innovative interactive learning tools, video and simulation laboratory environments in the teaching/learning process. Similar opportunities are offered by the initiatives *Coursera* and *Udacity*. According to the platform, *Coursera* is an education platform, collaborating with top universities and organisations worldwide, to offer courses online for free for anyone to take[60]. *Udacity* is an initiative that is aiming to build the so called "University by Silicon Valley", which teaches programming and data science skills through a

[59] OpenIdeao [interactive]. [accessed on 2014-10-05-]. <https://openideo.com/>.
[60] Coursera [interactive]. [accessed on 2014-10-05]. <https://www.coursera.org/>.

series of online courses and hand-on projects in close cooperation with industry employers[61].

Analysing Group 3 and Group 4 by CI indicators

Table 12. Sub-Group analysis by CI indicators

CI Indicators	Group 3: Content sharing		Group 4	
	Sub-Group 1	Sub-Group 2	Sub-Group 1	Sub-Group 2
Participant/ group variety (demographic, educational, cultural, etc.) and group size/ critical mass	M; various ways of engagement and interaction; easy access.	H; sense making activities; various engagement levels, attractive participation tools and channels (including off-line meetings); easy and equal access; participants' confidentiality when needed.	M; peer social interaction, peer review.	H; various ways to contribute; role play.
Group dynamics (teamwork (virtual access, off-line collaboration, anonymity, team management etc.) / individual participation in the group)	L; more crowd sharing than teamwork.	H; civic engagement and gamification platforms in particular; usually encouraged and stimulated by relevant technological solutions.	M; peer social interaction, peer review.	Team working tasks.
Impact of time and location (anytime, anywhere)	Ability to access and contribute anytime from anywhere.	Ability to access and contribute anytime from anywhere.	Ability to access and contribute anytime from anywhere.	Ability to access and contribute anytime from anywhere.
Anonymity (full/partial anonymity, use of nicknames etc.) / publicity solutions	Registration is required; full or partial anonymity is possible although discouraged for content contributors.	Registration is required in most cases. Full or partial anonymity is possible for content users; more openness is linked to additional benefits offered by the platform.	Registration required; full or partial anonymity is possible for content users.	Registration required; simulation; role playing.

[61] Udacity [interactive]. [accessed on 2014-10-05]. <https://www.udacity.com/us>.

Idea generation methods	Knowledge accumulation: information exchange, discussion, communities of practice interaction.	Knowledge accumulation: information exchange, discussion, offline workshops and meetings, communities of practice interaction; idea generation: brainstorming, voting, game, contest or market generated knowledge; contributions are encouraged by Creative Commons license; recognition of individual input.	Knowledge accumulation: information exchange, discussion.	Information exchange, discussion, offline workshops and meetings, brainstorming, voting, contest.
Strategic decision-making (idea generation/ decision to act)	Decision-making usually by the platform "owners" or platform administrators.	Depends on the issue: by the entire community (usually idea generation); decision-making: by the platform "owners", platform administrators or platform board.	By the platform "owners" or administrators.	By the platform "owners" or administrators.
Self-regulation (structural decision-making, leadership, conflict management), crowd vs hierarchy	Depends on the issue, but usually by the platform "owners", platform administrators or platform board.	Depends on the issue: by the entire community (usually idea generation); decision-making: by the platform "owners", platform administrators or platform board.	By the platform "owners" or administrators.	By the platform "owners" or administrators.

H – High, M – Medium, L – Low.
Source: developed by the author

In terms of *participant/group variety* and *group size/critical mass*, all initiatives of both platform groups (Social collaboration and Life-long learning/learning organisation) are encouraging participants' or group variety. In particular, this is encouraged in group 3 CI platforms of Civic engagement and Group 4 platforms (both MOOP and gamification). The main reason for this is the diversity of the experience that a participant can bring to the common pool of knowledge. For instance, when analysing participation in the *Discue* community platform, the variety and group

size of participants are considered as the main success preconditions for an effective functioning of the community because the quality of the platform depends on the range and quality of the discussions between the platform community members. This by the platform is ensured by creating the conditions for equal participation of all platform community members by also taking into account the cases when participants' confidentially is required. The platform offers a virtual place where the use of video communication tools or other mediums facilitate even a greater impact and open new possibilities for an easy participation, raising issues for an open discussion, expressing an individual opinion or providing more information on one or another topic. Platform developers hope that the more of such platforms exist, the fewer will be the cases of child exploitation in textile factories in Asia; disregarding the local community health and safety interests in the Taranto region in southern Italy, where one of the largest steel factories in the world disregards or frequently violates the environmental regulations, also such cases as the collapse of sewing factory in Bangladesh. This will be achieved because of the possibility to make the problems heard by the global community earlier than later and call for appropriate actions before irreversible crisis situations occur[62]. Other platforms see participant/group variety and group size/critical mass as the main underlying principles of the success of their activities, too, for instance, the platform *OneBillionMinds* sees this as a necessity for stimulating innovation, *OpenIDEO* also "depends on participation": "it's these efforts, these big and small moments of sharing and collaboration of a broad range of people, that make this platform a dynamic resource for tackling significant global challenges"[63].

This is achieved in various ways, for instance, by *combining various participation channels* (e.g., interactive and easy-to-use online participation tools with face-to-face community meetings, seminars and sessions, such as in *Beautiful PB* and *Liquid Democracy* initiatives). Such initiatives seek to connect all residents of a particular geographical location by offering technological tools to enable effective participation and contribution to the community activities and decision-making at each stage – starting with idea generation and ending with their implementation. For instance, at the moment, each member of one local community in the U.S. is invited to join

[62] Discue [interactive]. [accessed on 2014-12-05]. <http://www.discue.com/>.

[63] OneBillionMinds [interactive]. [accessed on 2014-12-05]. <http://www.onebillionminds.com>.

virtual platform and contribute to the *ConnectPB.com* project, of which the main purpose is to connect the Pacific coast with sustainable transport system corresponding to the needs and expectations of contemporary residents in terms of its security, convenience, efficiency and aesthetics[64]. Another aspect contributing to the larger group variety is, for example, an *easy access for everybody* and *attractive tools* or *sense making activity*, for instance, according to political science professor Christophe Bieber of the University of Duisburg-Essen, *Pirate Party*'s ability to attract people (and especially young people) to a political party organisation is quite a unique phenomenon, because "the image of party politics is not very good in general, but the party in Germany had 800-900 members at the start of 2009, and already 10,000 in the beginning of 2012"[65]. It is recognised that the technologies used by this party played their role in this process: "there are no doubts that the Pirates" uniquely technological bent has come in handy. Members have tools at their disposal to discuss issues online in large-scale dialogue, then bring the conversation offline to reach official consensus at party conventions. And this attracts people".

In terms of *group dynamics*, teamwork and individual participation in the group is encouraged especially in Sub-group 2 (Civic engagement) of Group 3 CI platforms and also in Sub-group 2 (gamification) of the Group 4 CI platforms. This, first of all, is ensured by the technological solutions, for instance, *Crowdbrite*[66] technological solution that is used by the *Beautiful PB* and *Liquid Democracy* tools used by *Pirate Parties around Europe*. For instance, *Crowdbrite* product helps to create an online collaboration space/platform, offering a funny and convenient participation in online brainstorming sessions, meetings and seminars, especially in cases, when joint local community efforts are needed to adopt one or another important community decision. Such technological tool allows visualizing goals, objectives and timeline of an initiative, project or a proposal, similar to using sticky labels in brainstorming sessions as well as collecting and managing contributors" comments. The instrument allows organizing discussions, monitoring the project or from anywhere and at any time submitting various

[64] Beautiful PB. *Creating a Sustainable Beautiful Pacific Beach* [interactive]. [accessed on 2015-01-05]. <http://www.connectpb.com/>.

[65] Meyer, D. *How the German Pirate Party's "Liquid Democracy" Works*. May 7 2012 [interactive]. [accessed on 2014-12-03]. <http://techpresident.com/news/wegov/22154/how-german-pirate-partys-liquid-democracy-works>.

[66] Crowdbrite [interactive]. [accessed on 2014-12-05]. <http://crowdbrite.com/>.

ideas. Typically, this tool is used by various types of project teams, urban planners, architects, public agencies, energy and sustainable development specialists and similar. So, both the *Beautiful PB* and the *Connect Lemon Grove* local community collaborations use this interactive cooperation and decision-making tool, especially in the cases when a joint decision in the areas of urban planning and local transportation networks and systems is required. *Pirate Parties* across Europe use *Liquid Democracy* tool – open-source software, powering internet platforms for proposition development and decision-making[67] that enables community members to discuss issues online in large-scale dialogue, then bring the conversation offline to reach official consensus at party conventions. The technological solution consists of two main tools stimulating teamwork and individual participation in a group – *PiratePad* (a collaborative text editor mainly for collaboration and discussion) and *Liquid Feedback Interactive Democracy* (about competition and decision-making) alongside with chatrooms, wikis and mailing lists to collaboratively work on policies. The basic idea of this tool is a democratic system in which most issues are decided (or strongly suggested to representatives) by direct referendum. Considering nobody has enough time and knowledge for every issue, votes can be delegated by a topic. Furthermore, delegations are transitive and can be revoked at any time. *Liquid Democracy* is sometimes referred to as *Delegated* or *Proxy Voting*.

Gamification usually relies on teamwork tasks; therefore, group collaboration is very important here. For instance, *Venture Spirit* uses an online gaming platform that is based on a Venture Capital market metaphor, a diverse crowd of multiple hundreds of people are engaged to jointly tackle real-life strategic challenges, where innovative ideas are captured, enriched into well-balanced plans and prioritized according to their value[68]. Regarding MOOP platforms, they too are based on individual learning in group tools.

In terms of impact of *time and location*, all platform sub-groups rely on technology-enabled "anytime/anywhere" access.

In terms of *anonymity/publicity solutions*, registration for content generation is required by all platforms, full or partial anonymity is possible although discouraged for content contributors.

[67] Liquidfeedback [interactive]. [accessed on 2014-12-05]. <http://liquidfeedback.org/>.

[68] Venture Spirit [interactive]. [accessed on 2014-12-05]. <http://www.venturespirit.com/concept/>.

In terms of *idea generation methods*, their spectrum is wide from information exchange, discussion, offline workshops and meetings, communities of practice interaction, brainstorming, voting, games or contests. Some of the platforms (for instance, *OpenIDEO*) recognises individual input to encourage participation and contributions: for instance, if *IDEO* posts a design problem, which moves through three phrases of development toward a solution, Inspiration, Concepting and Evaluation, users participate and provide feedback every step of the way, receiving points (known as their *Design Quotient*, or "DQ") for their contributions[69]. In addition, the majority of the CI platforms operate under a Creative Commons license and the jointly developed content is, thus, shareable, remix-able and reusable.

In terms of *strategic decision-making*, the approach depends on the issue. In the majority of cases of idea generation, the decisions are taken by the entire community; and in cases of the decision making – by the platform "owners" or platform administrators. For instance, the Pirate Party uses two main tools – *PiratePad* (a collaborative text editor mainly for collaboration and discussion) and *Liquid Feedback Interactive Democracy* (about competition and decision-making) alongside with chatrooms, wikis and mailing lists to collaboratively work on policies. According to the platform, the basic idea of the liquid democracy rests on democratic system in which most issues are decided by direct referendum[70]. Taking in mind that nobody has enough time and knowledge for every issue, votes are be delegated by topic. In addition, these delegations are transitive and can be revoked at any time. Structured feedback is intended to organize communication between an initiative and the voters. In order to allow voters to express preferences, the software has a very advanced voting system. According to political science professor Christophe Bieber of the University of Duisburg-Essen, in overall, "it's a trust-based approach and the nearest thing *Liquid Feedback* has to a reputation system, when Members don't get points-based kudos for their involvement and expertise; they collect real votes. Every delegated vote can be reclaimed at any time, so no "Pirate" can operate without a continuous mandate. We want effective people to be powerful and do their work, but we want the grassroots to

[69] OpenIDEO [interactive]. [accessed on 2014-12-05]. <https://openideo.com>.

[70] Liquid Feedback [interactive]. [accessed on 2014-12-05]. <http://p2pfoundation.net/Liquid_Feedback?title=Liquid_Feedback&action=edit>.

be able to control them".[71] The software has a wide application spectrum as, in addition to political parties, it can be used by associations/NGOs, government/civic participation, constituency/electoral district, economy/corporations. The *Discue* platform, in the meantime, says that given the fact that virtual platforms give a space for virtual communication between thousands of people, effective organisation of the communication process itself is a key to avoid disorder and ineffectiveness of the discussions being held on the platform if thousands of people speak at the same time[72]. Therefore, the platform offers a number of communication stream management tools that embed the main principle of democracy – the right to speak and to be heard. At the same time, they allow avoiding the situations when unimportant information blankets the essence of a discussion by the ability of any participant to intervene in a discussion at any time and the ability to rate the speakers according to the content of their statements in the discussion.

In terms of *self-regulation*, it usually rests within platform "owners", platform administrators or platform board.

Analyzing groups in terms of their motivation, technological solution and business model of the platforms.

Motivation, technological solution and the overall business model are the key factors for stimulating the viability and sustainability of the platform.

In terms of *motivation of platform participants*, the majority of Group 1 "Sharing and creating knowledge" platforms attracts the participants (contributors) mainly by social and intellectual motivating factors (especially the platforms of knowledge sharing where content developers through small user generated individual contributions, such as *Wikipedia*, *WikiHow*, *Answers.com* and similar). Social motivation here results in having fun and satisfaction of participation within the social (peer) networks of the so called knowledge philanthropists, where almost none of personal features (such as age, educational background, etc.), but the willingness and ability to contribute or share one's knowledge are important. Other aspects of social motivation include social communication, the joy of collaborating

[71] Meyer, D. *How the German Pirate Party's "Liquid Democracy"* Works. May 7 2012 [interactive]. [accessed on 2014-12-05]. <http://techpresident.com/news/wegov/22154/how-german-pirate-partys-liquid-democracy-works>.

[72] Discue [interactive]. [accessed on 2014-12-03]. <http://www.discue.com/>.

on something larger than any individual could achieve independently, the thrill of being read by a very large audience, social appraisal, self-realisation, values related to a volunteering nature of the activity, etc. In the meantime, intellectual motivation of such participation results in intellectual stimulation, new experience, learning, self- and professional development, etc.

A more specific motivating factor in this platform group is also an ability to build online reputation by sharing individual professional expertise that helps to establish relationships and become a well-known and trusted answers-provider in the contributor's business area (for instance, *Answers.com*). Also, other factors include participation in professional networks, knowledge sharing processes, professional development and additional opportunities to improve one's own product, technological features of the platforms because software tools for non-commercial projects are offered free of charge (for instance, *GitHub*). In addition, *GitHub* has produced an interesting positive motivating "side effect", where an account and active contribution to this platform is now considered as a sort of a substitute of CV by both the job seekers and employers in the field alike.

HealthTap platform allows registered doctors to develop a unique professional reputation using Internet enabled technology tools, to better serve their patients and to learn from each other through the so-called HealthTap + virtual practice. Doctors can also expand their geographical business boundaries and, in some cases, to gain more global influence on human health issues, if interested. Platform doctors contribute to increased public access to quality health information and have the opportunity to expand their professional networks and knowledge of learning from each other. For influencers or public health specialists or for those individuals who are interested in public health issues in general, the platform provides the ability to expand their social networks and the critical mass of their followers around the world. For other different types of groups, such as private clinics, their networks and similar, the platform offers an opportunity to advertise their business to much larger numbers of potential clients comparing to more traditional marketing possibilities and limited resources and to develop brand reputation. For a group of doctors, the platform may offer many possibilities to expand their experience and to develop a broader thinking. The platform also offers opportunities for medical students to learn from the best practices of longer practising doctors and to join international professional networks

around the world. *Chemical Abstracts Service*, *TED* and *FIZ Karlsruhe* provide access to a unique pool of knowledge. In addition, *TED* delivers different packages of services and products for various broad target groups (for instance, scientists, best field experts, educators, students and pupils, etc.), what motivates them to actively engage with the platform.

Direct financial motivation for platform contributors and users is not very common in this group of platforms, although not excluded, for instance, *TeamLiquid* organises contests and tournaments with financial remuneration of their participants, *TED* spends 1 million dollar worth annual *TED* prize in a conference to implement the best idea. Within this group of platforms, indirect financial motivation is more common and it is usually linked to the overall platform's business model (see below).

In terms of the motivation of users of these platforms, they are just motivated information seekers who search for instruction, insight and inspiration.

Within Group 2 of the CI platforms ("Decision-making/problem-solving"), for active platform participants all types of motivating factors (social, intellectual and financial/material) are widely common, where financial remuneration is one of the main motivating factors (but not limited to) in a number of platform Sub-groups (for instance, idea contests and virtual marketplaces). Many social and intellectual motivating factors are similar to the ones of Group 1 and play in a combination to a wide spectrum of specific motivating factors, such as unique knowledge pool, access to world class field expertise, contribution to knowledge accumulation process, peer networking (the *Millennium Project*), participation in co-creation process, social interaction with like-minders (for instance, *BMW Group Co-Creation Lab*), participation in a creative process, self-satisfaction of inventing something (*Quirky*, etc.), intellectual satisfaction (*InnoCentive*, etc.), available tutorials, specialized job offers (*Kaggle*, etc.). For companies, the main motivating factors involve extending their innovation capabilities for developing new products and services, convenience, value for money, etc.

Within Group 3 of the CI platforms ("Social sharing"), direct financial remuneration is rare but possible, although social motivating factors prevail, such as fun, social interaction, active citizenship, etc. In some cases, different platform participants have different motivation, for instance, representatives of public (especially local) authorities are very interested in boosting legitimation of their decisions and better understanding of

community needs; for the members of these platforms – new participation possibilities, such as transparency, scalability through division of labour, collective moderation and proportional representation of minorities (for instance, *LiquidFeedback* does not need a moderator; instead, all participants gain equal rights in a scalable structures discussion process where it is ensured that minorities gain a fair share of representation and that even individuals may put their proposals for discussion; moreover, the systems is designed in such way that minorities will not harm other minorities in the discussion process[73]), fully transparent decision-making process, preferential voting (for instance, LiquidFeedback does not ask predefined questions but encourages participants to suggest alternatives. A sophisticated voting system is facilitated to allow participants to express their opinions without a necessity of tactical considerations[74]).

Group 4 CI platforms ("Life-long learning/learning organisation") usually motivate with the possibilities for personal, professional and/or organisational development, high quality learning material, fun, user-friendly tools for participants and fun, new experience and ability to build highly rated reputation.

In terms of *technological solutions of the platforms*, these may act as additional motivators to engage with the platform. A general approach is that each of these 4 CI platform groups has their own basic technology solutions that would satisfy basic requirements of their platform participants, for instance, Group 1 extensively uses Wiki technology, which allows users to freely create and edit Web page content using any Web browser and it supports hyperlinks, has a simple text syntax for creating new pages and crosslinks between internal pages; Group 2 uses Collaborative creation, Co-creation, Crowdsourcing and Collaborating marketplace software, which offer great potential in cases requiring accumulation or processing of big data and various types of artefacts; Group 3 uses various online collaboration solutions, of which the most innovative so far is Liquid Democracy and an online Crowdbrite collaboration and decision-making tool; Group 4 mooc.org learning platform.

In addition, Wiki technology is also very often used as an additional technical functionality in many CI platforms because of its simple navigation to facilitate collaboration online. In addition to a basic technology, some

[73] Liquid Feedback [interactive]. [accessed on 2014-12-17]. <http://liquidfeedback.org/>.
[74] Liquid Feedback [interactive]. [accessed on 2014-17-12]. <http://liquidfeedback.org/>.

specific solutions are used to give a greater value to the platform users. For instance, in Group 2 platforms, The *Millenium Project* feeds and offers platform users *The Global Futures Intelligence System*, which offers *Real Time Delphi*, expert support in creating S*tate of the Future Indexes*, ability to organise international expert online conferences, access to future foresight field scenarios, ability to use specific foresight tools, such as *Future Matrix* enabling to analyse big data and information, etc. *GitHub* platform provides git hosting services (git is a version control software, which enables managing changes at any stage of a software development project without overwriting any part of that project) with many other features, such as Web-based graphical interface, access control and several collaboration tools, such as wikis and basic task management tools for every project. The set of tools offered by this platform is open to the community for public projects free of charge and is heavily used by both public (open code software developers in particular) and private projects. *IBM*, in the meantime, operates *Jams* and other *Web 2.0* collaborative mediums to facilitate internal company's collaborative innovation. *AHHA*, a platform of social ideation, uses *Creative Barcode* technology to help the contributors with the protection and safe sharing of ideas and early-stage concepts. *Quirky* is a social ideation platform, which runs a piece of technology that enables to track down to a fraction of a percentage how impactful each and every community member was over the successful development of the product[75]. *InnoCentive*, for example, as crowdsourcing platform, has developed very robust crowdsourcing products; another crowdsourcing platform, *Hypios*, which helps corporations meet specific R&D needs in the meantime, is specializing in the so called "intelligent crowdsourcing" – it relies on core proprietary software (hy.Proximity) for in-depth semantic analysis of each problem and competency discovery technology able to sound the web to find relevant experts. Both *The Amazon Mechanical Turk* and *Clickworkers*, as crowdsourcing Internet labour marketplaces, have implemented "Requesters" section, which enables to post tasks known as HITs (*Human Intelligence Tasks*). Providers then can browse among existing tasks and complete them for a financial remuneration set by the Requester.

A number of Group 3 platforms use *Crowdbrite* technological solution (for instance, *Beautiful PB*, *Connect Lemon Grove*) and *Liquid Democracy* tool (for instance, *Pirate Parties around Europe*) and other tools especially

[75] Quirky [interactive]. [accessed on 2014-12-17]. <https://www.quirky.com/>.

serving a unique need of one or another CI platform. *Crowdbrite*[76] product is designed as an interactive collaboration and decision-making tool that helps to create an online collaboration space/platform, offering a funny and convenient way of participation in online brainstorming sessions, meetings and seminars, which are particularly suitable for community projects. *Liquid Democracy* technological solution consists of two main tools – *PiratePad* (a collaborative text editor mainly for collaboration and discussion) and *Liquid Feedback interactive Democracy* (about competition and decision-making) alongside with chatrooms, wikis and mailing lists to collaboratively work on policies. In order to allow voters to express preferences, the software has a very advanced voting system.

Votes can be delegated by a topic, but delegations are transitive and can be revoked at any time. The software has a wide application spectrum and, in addition to political parties, it can be used by associations/NGOs, government/civic participation, constituency/electoral district, economy/corporations.

Group 4 (*MOOC*) platforms rely on mooc.org platforms (for instance, MOOC: *Edx*, etc.). Gamification uses its own technological solutions.

In terms of *business model of the platforms*, almost all of these CI platforms deliver a free-of-charge content, but at the same time they are for-profit companies. Therefore, in addition to their focus on creating a global public good, they have to support themselves financially. Various business models are applied to generate monetary income.

The majority of Group 1 platforms rely on deep data mining, offering its users' community various types of external advertisement activities on mobile, tablet or desktop devices, social media, target marketing and open innovation purposes, offering specific target audience of its platform users (for instance, *Team Liquid* offers several advertising options available for advertisers looking to reach highly engaged 18-24 male gaming audience), running online stores with unique goods (e.g., *Team Liquid T-shorts*), providing extra services for a small charge, offering service for a charge for for-profits (e.g., additional git hosting services for companies), while giving for free of charge to the community for public projects. In this respect, *Avvo*, for example, generates revenue by selling advertising and other services primarily to lawyers, such as *Avvo* Websites

[76] Crowdbrite [interactive]. [accessed on 2014-12-17]. <http://crowdbrite.com/>.

for attorneys[77]. An additional source of revenue for Avvo is through a monthly subscription service called *Avvo Pro*, which allows lawyers to remove advertisements from their profile, including advertisements by competing lawyers, which may appear on non-*Avvo Pro* lawyer profiles. *Avvo* also offers special software for lawyers to manage their business pipeline, for instance, by using it, they get notified via email or text message the instant a new contact comes in, helping to turn contacts into clients; in addition, any prospective client who contacts by phone or email will automatically appear on dashboard, allowing to see and track all incoming leads. On the *HealthTap,* registered doctors may receive additional financial gains by providing paid online services in addition to free-of-charge ones. For the software developers, the platform offers vast medical knowledge and personified health information resources that are managed by proprietary rights and specifically for the purpose designed ontology tools. By using information resources of the platform, they can easily develop new products for various product and service markets. In addition to the above mentioned financial resources, Group 2 platforms use annual subscription fees (e.g., *The Millenium Project*), get interest fees from companies wanting to use their platforms for problem-solving/ idea contest/virtual marketplace purposes. Problem solvers get financial remuneration for their work.

Regarding Group 3 business models, there is a wide spectrum, too: starting from deep data mining, advertisement, reaching specific target audiences, providing extra services for a fee, providing various specialised website features and tools for an extra fee for commercial purposes, for instance, the *Discue* platform, which offers for companies its broadcasting online video tool for an organised remote online communication for over 200 participants (many-to-many communication approach). Companies develop new products and services. Product development teams get direct financial remuneration for the products they helped to develop.

Regarding Group 4 business models, the majority of the MOOP platforms are still in search of their sustainable business models. Gamification platforms usually charge for using their products of organisational development.

Summing up. The variety of CI platforms is extensive. They offer great ideas, possibilities, technological solutions and business models. Still,

[77] Avvo [interactive]. [accessed on 2014-12-17]. <http://www.avvo.com/for-lawyers/pricing>.

a great unused potential is associated with the CI platforms offering tools and resources for decision-making and problem-solving, such as business knowledge, social ideation, intelligent crowdsourcing, idea contests and virtual marketplaces. Social collaboration and life-long learning/organisational learning are another two areas where traditionally performed activities could be transformed into a completely new quality of civic engagement applications, individual as well as organisational learning and development.

All of these platforms encourage participant or group variety as an additional or direct resource for the platforms. The majority of the platforms stimulate teamwork or individual participation in the group. Technologically mediated solutions enable access and, therefore, an ability to contribute anytime from anywhere. Anonymity is possible, but discouraged by additional possibilities for registered users. There is a great variety of idea generation methods: from information exchange, discussion, online and offline workshops and meetings, communities of practice interaction to brainstorming, voting, game, contest or market generated knowledge. Depending on the platform, the strategic decision-making by the majority of the platforms is usually assigned to the platform community in cases of idea generation and assigned to the platform "owners"/administrating teams/ advisor committees or a board of Trustees and similar in cases when decision to act is required. Group size/critical mass, as the diversity of participants or groups, is essential for all platforms to reap the full potential of the benefits that one or another platform is up to and there are many tools and strategies used by them to encourage this. In terms of self-regulation, the majority of the platforms usually apply structural decision-making, leadership, conflict management procedures to some extent, but the approach is rather drifting towards the community self-organisation than the hierarchical structure.

Motivation, technological solution and the overall business model are the key factors for stimulating the viability and sustainability of the platform. In terms of motivation, social as well as intellectual motivation prevails in many cases, but financial remuneration is very common in the platforms contributing towards decision-making and problem-solving.

Technological solutions are also very important, as sometimes they become the most important factor for attacking and retaining platform users and contributors. Each platform has a package of main and unique technological tools to satisfy their specific needs, which are then combined with more widely used relevant technological functionalities.

Table 13. Motivation, technological solution and business model of the platform groups

Group of CI platforms	Individual/group motivation of content contributors/participants (material, intellectual, social)	Technological solution	Business model of the platform
1. Sharing/ creating knowledge	Content contributors: mainly social (social communication, participation in a global group, social appraisal, self-realisation) and intellectual motivation (new experience, learning, knowledge philanthropy, etc.); platform support for content creators. Content readers: information search for instruction, insight and inspiration.	Main: Wiki technology, unique platform software corresponding to the particular needs of one or another platform (for instance, TeamLiquid, GitHub, information management software of the Chemical Abstracts Service, etc.). Alongside with chatrooms and mailing lists.	Deep data mining, advertisement, reaching specific target audience (e.g., TeamLiquid), running online stores of their own products, providing extra services for a fee. Annual subscription fee, publications, use of other community resources (e.g., Chemical Abstracts Service). Various specialised website features and tools (e.g., special software for lawyers to manage their business pipeline/special software for doctors). Special service packages for companies.
2. Decision-making/ problem-solving	Participants: social, intellectual and financial/material (main). Unique knowledge pool, access to world-class field expertise, contribution to knowledge accumulation process, peer networking, participation in co-creation process, social interaction with like-minders; participation in a creative process, self-satisfaction of inventing something, intellectual satisfaction, available tutorials, specialized job offers. Companies: extending their innovation capabilities for developing new products and services, convenience, value for money.	Main: collaborative creation, co-creation, crowdsourcing and collaborating marketplace software, Wiki technology. Additional: information management software; unique platform software corresponding to the particular needs of one or another platform (for instance, The Global Futures Intelligence System, git hosting services, Jams and other Web 2.0 collaborative mediums, etc.), Creative Barcode technology, the piece of technology that enables tracking down individual contributions; intelligent crowdsourcing technology. Alongside with chatrooms, wikis and mailing lists.	Annual subscription fee, interest fees from companies wanting to use CI platforms (for problem-solving/idea contest/virtual marketplace purposes in particular). Problem solvers get financial remuneration for their work. Companies develop new products and services. Product development teams get direct financial remuneration for the products they helped to develop. Special service packages for companies.

3. Social collaboration	Direct financial remuneration is rare but possible, although social motivating factors prevail, such as fun, social interaction, active citizenship. Also boosting legitimation of decisions adopted, better understanding of community needs, new participation possibilities, such as transparency, scalability through division of labour, collective moderation and proportional representation of minorities, fully transparent decision-making process.	Main: various online collaboration solutions, enabling interactive collaboration and decision-making (combining online and off-line participation possibilities). Additional: unique platform software corresponding to the particular needs of one or another platform (for instance, Liquid Democracy, Crowdbrite, Ushahidi used technologies, such as interactive mapping, multiple data streams, etc.). Alongside with chatrooms, wikis and mailing lists.	Deep data mining, advertisement, reaching specific target audience, providing extra services for a fee. Various specialised website features and tools for an extra fee for commercial purposes. Special service packages for companies.
4. Life-long learning/ learning organisation	Personal, professional and organisational development, high quality learning material, fun, user-friendly tools; for mentors: fun, new experience, reputation.	Main: mooc.org education platform, gamification tools.	The majority of the MOOP platforms are still in search of their sustainable business models. Gamification platforms usually charge for using their products of organisational development.

There is a great variety of the overall business models of the platforms. Each platform tends to use its unique advantages to generate financial income.

NOTE: The same table is used again! The same information is presented in Table 13.

3.4. Defining Criteria for Collective Intelligence: Hypothesis Formulation

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The next step in this chapter is the intent to propose a set of criteria for measuring Collective Intelligence in CI systems (online community projects). According to Luo et al. (2009), online communities, although different in functionality, "seem to share some basic common attributes and provide the potential for the design of a general methodology that will allow the systematic development and optimization of CI systems". In this chapter, the common features, as well as the main challenges in the construction of generic Collective Intelligence system model, are identified.

In the context of new digital collaborations and communication, channels vast of various definitions have been proposed for the characterization of Collective intelligence (CI) phenomenon. As discussed in previous chapters (see more in Chapter 2.3.1), generally, the concept of "intelligence" refers "to the ability to learn, understand, act purposeful and to adopt and effectively deal with environment by using own knowledge" (Leimester, 2010). Collective-level intelligence emerges from "in-group knowledge exchange activities such as collaborative learning and problem solving, which takes the form of opinion and expertise exchange" (Luo et al., 2009). The scientific literature defines CI in various ways – "the distributed knowledge and expertise of individuals located inside and outside the formal boundaries of the enterprise, group, community" (Lesser et al., 2012); "the capacity for information processing, efficiency with which group is able to solve problems, quality and timing of group decision-making" (Goyal and Akhilesh, 2007); "a matter of building scenarios around a problem-solving situation" (Boder, 2006), etc. (see more in Chapter 2.1). Applying structural approach, Collective Intelligence systems (Figure 9) can be conceptualized

"as knowledge network created by web-mediated (social technologies) interaction amongst individuals with personal knowledge" (Luo et al., 2009). "The members can "externalize" their personal knowledge to the media network by, for example, posting articles in some Web-space. By reading the articles, some other members may assimilate the embedded knowledge into their own knowledge structure. In this way, the media network then intermediates to connect the knowledge structures of the different community members. The development of the knowledge network is essentially based on the creation, transmission and fusion of knowledge within the community" (Luo et al., 2009).

Figure 9. Social technologies mediated environment for Collective Intelligence emergence

Source: developed by the authors

Apart from focusing on specific problems solved through the application of CI-inspired techniques, a number of research efforts

contribute to modelling the functionality of CI systems. An attempt to identify the most basic characteristics of CI systems was made by Lykourentzou (2011). The conceptual model created by the mentioned author contains a static or structural view and a dynamic view and includes three specific values: (1) the set of possible individual user actions, which influence the system state, defined as the minimal set of variables that may describe the important aspects of system; (2) the system state; (3) the community and individual objectives, which refer to the benefit that the community aims at through the use of the CI system, while the individual objectives refer to the benefit that each user foresees in the use of this system. In addition, the author specify three important functions mandatory when modelling Collective Intelligence systems: expected user action function, future system state function and objective function (Lykourentzou, 2011).

Prahalad and Ramaswamy (2004) designed a theoretical framework of building blocks necessary to facilitate a co-creation environment. The interaction between organization and their customers happens through four main building blocks of co-creation: dialogue, access, risk and transparency (DART model). According to Luo et al. (2009), the key feature of "community intelligence" (the authors use this definition for describing Collective Intelligence of online communities) is that it is self-organising and "emergent". By developing individual cognitive processes and transmitting them to others, members" efforts lead to collective cognitive processes of communities (Lykourentzou et al., 2011). The main difference of CI from team or organization intelligence is the lack of "swarm effect" due to a small number of individuals involved. Massive participants" inclusion into interactions ensures emergence of greater intellectual capabilities. Online communities tend to be more dynamic and open, a feature that sets them apart from businesses, government bodies and other institutional organizations. Because of flexible and vague boundaries of online communities, people have more freedom of joining and leaving as opposed to fixed boundaries of institutional organizations. This results in easier recruitment of new members and continual flow-in of new ideas and knowledge. In contrast to structured organizations, CI systems are more dynamic. In other words, "community intelligence is more suitable to be modelled as a "neural network" of the individual participants, analogous to a human brain that is a network of the biological

neurons". The Structural Model of Community Intelligence (Luo et al., 2009) explains how the community level intelligence may generate from the knowledge-related activities of the participants or the community members. First, the community should "contain a memory system that stores information and knowledge, analogous to the memory system in a human brain. Second, the community should have the capability of "intelligent" problem-solving, i.e. the capability of utilizing the stored knowledge to solve problems; and the community should commonly exhibit higher-level intelligent capability than any community member" (Luo et al., 2009). The knowledge network embodies the collective knowledge of the community and consists of a technological network or media network that supports information and knowledge transfer, a human network of community members and a content network of knowledge and information, which is hosted in humans and computer systems (Luo et al., 2009).

Rodriguez (2005) suggested paralleling CI to individual intelligence and performance of human brain as a strategy of CI modelling. Basing its findings on ideas from neuroscience field, the author describes the way that "human brain finds solutions to problems that it has not yet encountered, by storing the already seen experiences and solutions to lower levels of its cortex, and then by grouping similar events to a more abstract higher-level of the cortex" (Rodriguez, 2005). Hence, human brain uses the higher levels of its cortex to perform a pattern-matching procedure in order to solve problems. Rodriguez offers to model Collective Intelligence in a similar manner using solutions suggested by community users who can access the generic higher-level of the CI hyper-cortex to find problem solutions.

The researchers' team at Massachusetts Institute of Technology "MIT Center for Collective Intelligence' proposed a conceptual framework of Collective Intelligence Genome where main structure elements are identified as "Staffing" (Who is performing the task?), "Incentives" (Why are they doing it?), "Goal" (What is being accomplished?) and "Structure/ Process" (How is it being done?) (Malone, Laubacher and Dellarocas, 2010). The answer to each of the questions creates the possibility to evaluate systems ability for the emergence of CI.

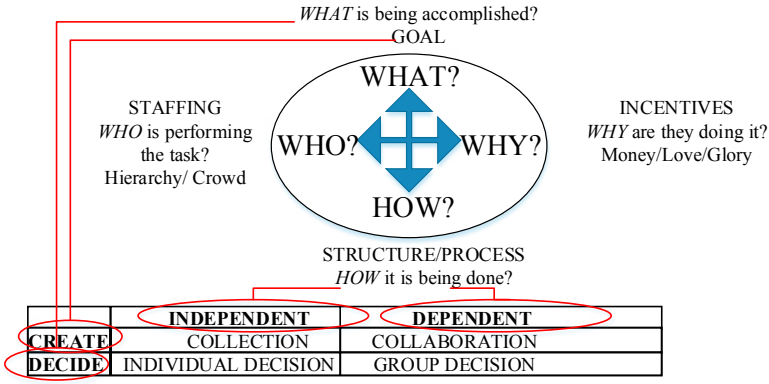

Figure 10. CI Genome

Source: adapted from Malone, Laubacher and Dellarocas, 2010

Staffing refers to the characterization of the group that is involved in Collective Intelligence emergence, mainly about its structure and relationship between structure elements. The researchers distinguish two types of groups: *crowd*, where anyone in the large group can take activities, without being assigned by someone in a position of authority; and the *hierarchy*, a group of individuals, where someone in authority assigns other participants to perform the task.

Closely related to the Staffing element is Incentive. This element characterizes groups or individuals in the group motivation. The creators of Genome (Malone et al., 2010) argue that *Money*, *Love* and *Glory* lead people to participate in Collective Intelligence system. Other two elements – Goal and Structure/Process – are related to process/activity characterization. Malone et al. (2010) distinguish two main goals for which participants are aiming: create, in case the system generates something new, and decide, where participants evaluate and select alternatives. At the same time, these activities differ according to dependencies between their contributions. While creating this, participants could be involved in collecting separate ideas or collaborating to create something new. An important aspect of the decision-making is whether group members evaluate and select alternatives individually or they make a group decision by voting, consensus or averaging, e.g., individual aspirations for Love or Fame may reduce expenses. Corporations, such as Amazon.com, save expenses for reviews as reviews are made by readers who seek

acknowledgment and get satisfaction by contributing to educational activities. Monetary prizes or aspirations for *fame* may help the *crowd* to work faster towards a set goal (Malone et al., 2010). Analysis of various motivation factors and their impact on activity results may lead towards a conclusion that the choice of motivation and combinations of various motivation factors constitute an important complex phenomenon that plays a crucial role in the success of the collective intelligence system.

The paper of Wise, Paton and Gegenhuber (2012) addresses the challenge to an expansion of the model ("Malone Model") proposed by Malone et al. (2010) within the public sector. The researchers believe that the model proposed by Malone (2010) is unsuitable for application in the public sector and, therefore, they proposed five new "genes" to supplement Malone's model: (self-) interest, civic duty, evaluation, public feedback and not public feedback. As the key motives to act in the public sector, they identify civic obligation and (personal) interest.

Other authors distinguish intrinsic and extrinsic motivation factors (Deci and Ryan, 2008). The intrinsic motivation is predetermined by individual's aspiration to develop personal competencies and relatedness. Based on this categorization, Wang (2014) identified a set of motivating factors to be considered and addressed to promote wide participation: extrinsic motivation type, autonomy or competence-related and relatedness-related motivation type. Extrinsic motivation is typically based on monetary compensations and prizes (Frey et al., 2011), peer recognition, career opportunities or on enhancing status in the community (Leimeister et al., 2009; Frey et al., 2011). Autonomy-related motivation may be characterized as a sense of ownership or an ability to control the situation, opportunity to realize personal creativity (Von Hippel and von Krogh, 2003; Roberts et al., 2006). Baumann (2001) sees freedom of opinion and presence in the community as contradicting concepts. Community membership means refusal of autonomy and, sometimes, personal identity. However, refusal of community membership also means a loss manifesting in reduced security and the loss of the sense of community. Competence-related motivation is grounded upon the opportunity to learn and improve (Leimeister et al., 2009), and the aspiration to belong to a group may be based on altruism or intention to find friends (Frey et al., 2011). Frey et al. (2011) drew an important conclusion that the most valuable input is contributed by the people who are driven by intrinsic motivation factors. Chai et al. (2010)

analysed member motivation and motivation changes in open access communities and arrived to the conclusion that despite being led by personal ambitions and unperceived scale of knowledge present in the system, participants succeed to valuably contribute to a common product. People are especially creative when they aspire for new knowledge for mere enjoyment; therefore, in developing new platforms promoting innovation, it is important to focus precisely on promotion of such motivating factors.

The importance of intrinsic motivation is constantly growing with the growth of social networks as the networks are used not only to share information, but to create new knowledge, as well. "With no users, there is no content and with no content, there are no possibilities for new users to appear" (Das and Lavoie, 2014). Researchers unanimously agree that a social feedback present in the network may intensify participant activity. Wu et al. (2009) ground their conclusions on YouTube and Digg examples, whereas Zhu et al. (2013) analyse feedback in Wikipedia. Feedback helps the user to decide whether to enroll into activities or not, and that is why users typically choose communities that give more feedback than others (Das and Lavoie, 2014).

Crowd and *hierarchy or control* genes suggested by Malone (2010) facilitate the understanding of what helps the community to implement their goal. For instance, in the case of Wikipedia, leaders automatically emerge from the crowd. On the other hand, Collier and Craut (2012) state that leadership does not emerge automatically as leaders have to be coined and educated. Socialization, commitment to the community and mentoring processes facilitate appearance of potential leaders in the social context. Having observed social networks, Collier and Craut (2012) came to a conclusion that participants become leaders by acquiring experience in a network organization and helping new members to join the organization. Although some online communities externally seem to be self-organizing and have a plain structure, they frequently rely upon centralized coordinated activities and have long-term objectives and formal organizational policy formed by leaders (O'Mahony and Ferraro, 2007; Dahlandar and O'Mahony, 2010).

Having analyzed the problem of leadership within online communities, Katz et al. (2004) arrive to a conclusion that centralized management has a significant impact upon the individual or group functioning. On the basis of personal research, they state that centralization has more benefits when the

objective is simple, whereas decentralization grants more advantages where more complex and more ambitious goals are sought (Katz et al., 2004).

A different way of analyzing and identifying intelligence in group, organization or community is presented in Goyal and Akhilesh's (2007) study. The authors proposed a model of work teams' intelligence related to innovativeness, where factors that enhance overall group ability to act effectively are presented. Overall group ability reveals itself in social capital, emotional and cognitive intelligence of the group. According to Goyal and Akhilesh (2007), group size, leaders' behavior, group cohesion, group history, control mechanism, heterogeneity of the members, group norms, shared vision, commitment to team goal, organizational culture, specific task at hand, individual members' capabilities impact the overall ability of the group.

Lykourentzou et al. (2011) classify CI systems into passive and active. Members of passive systems act as if the system was absent; however, such systems may have features of crowd behaviour. Such systems employ technologies to facilitate coordination of individual and community goals (e.g., coordination of traffic networks). In the case of active systems, crowd behaviour is generated and coordinated to achieve the system's specific goal. Active systems may also be subdivided into collaborative, competitive and hybrid. Wikipedia, frequently drawn in the present monograph as an example, is an active collaborative CI system as its actors collaborate to achieve a common goal. Hybrid platforms incorporate both, competitive and collaborative, elements. Related to this, Levine and Prietula (2014) argue that "a group's cooperative outcomes can be remarkably well predicted if one knows its type composition". The general human population has been estimated to consist of three cooperative types: *cooperators* (13% of the general population), *reciprocators* (63%) and *free riders*(20%). The remaining 4% are too inconsistent to be categorized. Tinati et al (2014) state that active users generate about 70% of the content and constitute the core of the community. Although some communities count large numbers of participants, the actual work is frequently undertaken by a small number of people. Majchrzak and Malhotra (2013) emphasize that the key challenge in collaborative systems is caused by the stress between collaboration and competition.

The Internet has a reputation of transparency-boosting medium, but it does not necessarily work as a prescription for smart reform, which requires a thorough empirical investigation into the world of politics (Morozov,

2013). Theoretical and empirical study of Dabbish et al. (2014) suggests that "providing transparency of actions on shared artifacts supports cooperative work" and proposes a variety of ways that transparency can support innovation, knowledge sharing and community building. However, Morozov (2013) is convinced that information "should be distributed in full awareness of the social and cultural complexity of the institutional environment in which it is gathered". Limited transparency is crucial in some cases, when social relations that enable that environment need to be preserved, e.g., to make policing of crimes possible (Morozov, 2013). When we seek to increase or decrease transparency in some aspect of our private or public lives, we should do it not because we value transparency as such, but because transparency promotes or undermines other, higher goods. Philosopher O'Neil (2007) was observing how various transparency schemes might erode, rather than strengthen, trust. In O'Neil's view, fostering trust is a much more important public objective than fostering transparency. She writes that "increasing transparency can produce a flood of unsorted information and misinformation that provides little but confusion unless it can be sorted and assessed. It may add to uncertainty rather than to trust […] Transparency can encourage people to be less honest, so increasing deception and reducing reasons for trust, those that know that everything that they say or write is to be made public may message the truth".

Close related to transparency is the problem of independence. Violations of the independence condition might decrease the accuracy of the crowd (the promotion of the idea to friend or relatives, also down voting, where some users create multiple accounts to give high scores to their own designs and low scores for everyone else) (Salminen, 2014). Previous studies (Mavrodiev et al., 2012; Lorenz et al., 2011) have reported impaired independence of thought by social influences in crowdsourcing platforms. Face-to-face group processes in organizations often lead to polarization when faced with social influences (Janis, 1982; Isenberg, 1986). Independent expression can also be damaged by external pressures, such as managerial influence and intolerance to mistakes (Zhou and Fink, 2003; Michailova and Husted, 2003). According to Norvaišas (2011), in order to eliminate negative social, psychological and other subjective impacts (subjectivity), anonymity of participants in online communities must be guaranteed.

According to Boder (2006), Collective Intelligence emergence is composed of three building blocks: competencies development,

goal development and mechanics development. The dimensions of this composition are deducted from pre-existing knowledge and are developed in order to achieve Collective Intelligence. The first one is the developments of the competencies that derive from the domain-specific knowledge of the community. The purpose of this dimension is to acquire complementary competences. The second dimension helps coordinate and integrate various approaches and establish a common goal. The third component is coordination and mechanisms of interrelations between individual dimensions. Interrelations stem from both formal and informal communication norms and community culture, thus, aspects of trust and respect should be taken into consideration.

While analyzing the proposed model, inferences could be made that competencies are related to the group or individual characteristics as it refers to pre-existing domain-specific knowledge of the group and its members and goals and mechanics correspond to process/activity characterization, as they both represent what goals and how they are being achieved (Table 14).

Table 14. Criteria for Collective Intelligence identification

<table>
<tr><th colspan="6">Criteria for Collective intelligence identification</th></tr>
<tr><td>Identification dimensions</td><td>Boder, 2006</td><td colspan="2">Malone et al, 2010</td><td>Wise et al, 2012</td><td>Goyal, Akhilesh, 2007</td></tr>
<tr><td rowspan="6">Group and individuals characteristics</td><td rowspan="6">Competencies drawn from pre-existing organizations domain specific knowledge</td><td rowspan="2">Who?</td><td>Hierarchy</td><td rowspan="2"></td><td>Leaders behavior</td></tr>
<tr><td>Crowd</td><td>Group size, group cohesion, group history, group norms</td></tr>
<tr><td rowspan="3">Why?</td><td>Money</td><td rowspan="3"></td><td rowspan="3">Shared vision, individuals members capabilities, heterogeneity of the group</td></tr>
<tr><td>Love</td></tr>
<tr><td>Glory</td></tr>
<tr><td rowspan="2">Why? in public sector</td><td rowspan="2"></td><td>Self-interest</td><td rowspan="2"></td></tr>
<tr><td>Civic duty</td></tr>
</table>

Process/ activity character-istics	Goals drawn form strategic market knowledge *Competitive CI systems (Lykourentzou et al, 2011)*	How? Decide	Group decision (Voting/ Consensus /Predicting Markets/ Averaging)		Control mechanism, commitment to the goal, specific task
			Individual decision (Markets/ Social networks		
	Mechanics impacted by cultural norms *Hybrid CI systems*	How? Create	Collection (Contest)		
			Competition		
			Collaboration		
	Collaborative CI systems (Lykourentzou et al, 2011)	How? *in public sector*		Evaluate	
				Feedback public	
				Feedback not public	

Source: Paunksnienė and Skaržauskienė (2013)

Schut (2010) distinguishes enabling and defining properties of CI. The existence of enabling properties, such as adaptivity, interaction and rules executed at a local level, makes it possible for Collective Intelligence to emerge from a system ("how do we build CI systems?"). The defining ones are those that if these properties are observed, the system is a CI one ("how can we better understand CI as observed in nature, including human nature?"). If the system can be observed to show a distinction between global and local, randomness, emergence, redundancy and robustness, the system is a Collective Intelligence one. The former are on the local (agent) level, whereas the latter are on the global (system) level (Schut, 2010).

The researchers, led by Woolley (2010), an organizational psychologist at Carnegie Mellon University in Pittsburgh, Pennsylvania, were investigating the factors influencing the interest to participate in communities or to contribute to collective effort. Study of 669 people grouped to work in small entities revealed that, in order to predict a group's performance, one should not measure the average intelligence of the individuals in the group. Factors, such as adaptation to social cues,

willingness to take turns when speaking or proportion of women in the group, were more important in such calculations. Influence of proportion of women in a group on Collective Intelligence can be explained by differing sensitivity of genders towards social issues: women tend to be more sensitive. Woolley et al. (2010) suggest that "'social sensitivity" is a key ingredient of successful teams". Results of this large-scale study offer meaningful evidence for the existence of CI in groups similar to a well-known ability in individuals. Both composition of the group (e.g., average member intelligence) and factors that emerge from the way group members interact when they are assembled (e.g., their conversational turn-taking behavior) influence the emergence of Collective Intelligence (Woolley et al., 2010).

To constitute a society, community members have to integrate sympathies to build a greater whole (Costa, 2006). Such integration can be achieved by earning the esteem, respect and trust of unfamiliar persons. "This is one of the roles of "core community" is not governing or regulating the relationships, but […] integrating them into a greater whole, by using the values and regulations" (Costa, 2006). The level of social capital of a community, or maturity of a community, is a factor that points to the potential for interrelation among people and at this ability to build collective trust, but it is also an indicator of the motivation of each individual. Therefore, assessing the maturity of social orientation means understanding at which stage the collective actions and trust among community members are.

Table 15. Criteria for Collective Intelligence: Theoretical reasoning

Criteria	Theoretical Reasoning
Development of new ideas, prototypes, competencies, activities	Identifies "the ability to create something new and emergent: creative nature or the task or nature of the output of the collective activity" (Yu et al., 2012). While creating this, the participant could be involved in collecting separate ideas or collaborative contributions to create something. Malone et al. (2010) distinguish two main goals for which Collective Intelligence is aiming: create, when system generates something new, and decide, where participants evaluate and select alternatives.

Diversity in the source of ideas	Describes "the differences in demographic, educational and cultural backgrounds and the ways that people represent and solve problems" (Hong and Page, 2004). "Fresh new source of ideas and knowledge may then be brought in together with the recruitment of the new members; and this continual flowing-in of new ideas and knowledge is beneficial for knowledge innovation inside the community" (Luo et al., 2009). CI is "correlated to gender orientation – the proportion of females in the group" (Malone et al., 2012). Page (2007) proved using mathematical modeling and case studies that "power of diversity creates better groups, firms, schools and societies" (The Diversity Theorem). Diversity in cooperating partners expresses access to different types of knowledge and a variety of cooperation skills (Spila et al., 2012).
Dynamism, openness and flexibility	"One critical difference between an online community and an institutional organization (e.g. a business company or a governmental agency) is that the community is more open and flexible" (Luo et al., 2009). "The community boundary is vague and people have more freedom of joining and leaving the community "(Luo et al., 2009).
Knowledge aggregation, knowledge transmission and fusion	"The development of the knowledge network is essentially based on the creation, transmission and fusion of knowledge within the community" (Luo et al., 2009). Collective-level intelligence emerges from "in-group knowledge exchange activities such as collaborative learning and problem solving, which takes the form of opinion and expertise exchange" (Luo et al., 2009); "the distributed knowledge and expertise of individuals located inside and outside the formal boundaries of the enterprise, group, community" (Lesser et al., 2012). Aggregation refers to mechanisms for pooling and processing individual estimations to a collective estimation, the combination of individual pieces of information to form a synthesis or collective estimation. Aggregated output – collections of each individual's work, integrating participant's work – can produce something novel. Averaging might be the most common method of aggregation (information aggregation or prediction markets (Bothos et al., 2009), social tagging or folksonomies (Gruber, 2007; Zettsu and Kiyoki, 2006) and data visualization (Chen, 2007)). According to O'Leary (2008), "knowledge management needs by capturing knowledge from those who have it, converting knowledge into an explicitly available format, connecting those who want knowledge with those who have it and linking knowledge to knowledge".

Decision-making and problem-solving	Describes the capacity "for information processing, efficiency with which group is able to solve problems, quality and timing of group decision-making" (Goyal and Akhilesh, 2007); "a matter of building scenarios around a problem-solving situation" (Boder, 2006), etc. Decision support requires a high amount of information processing and the evaluation of potential solutions (Bonabeau, 2009; Leismester, 2010), so the decision support tasks can be divided into generating alternative solutions (this activity is closely related to idea generation) and evaluating them. Malone et al. (2010) distinguish two types of decision-making: (1) *group decisions* and (2) *individual decisions*. Ways of decision-making (group or individual) determine what environment, technologies and processes are involved. In the decision-making, an important aspect is whether group members evaluate and select alternatives individually or they make group decision by voting, consensus or averaging. "Community should have the capability of "intelligent" problem-solving, i.e. the capability of utilizing the stored knowledge to solve problems" (Luo et al., 2012). Human group demonstrates higher capabilities of information-processing and problem-solving than an individual (Heylighen, 2002). Both a simulation model (Hong and Pag, 2004) and an experiment with humans (Krause et al., 2011) have shown that under certain conditions groups of diverse problem solvers can outperform groups of high-ability problem solvers. Furthermore, the best problem solvers were biased in their estimations, while the group, as a whole, was accurate (Krause et al., 2011).
"Critical mass" of contributors within community to reach "swarm effect"	Critical mass is the minimum number of individuals that need to use the system so that it will function effectively. "The critical mass may be at first roughly estimated for the specific problem e.g. through simulation modelling and then, after an initial period of system use it can be further fine-tuned to match the exact number of necessary users" (Lykourentzou, 2011). "The main difference of CI from team or organization intelligence is that team intelligence usually involves a small group of people and thus it lacks the "swarm effect." The higher-level of intellectual capabilities emerge from the interactions of massive participants" (Luo et al., 2009). More contributors increase the effort and energy dedicated to creating content and provide a broader array of knowledge and abilities for content. "Research on prediction markets, virtual teams, and social networks suggests that the quality of aggregate information, number of ideas generated, and likelihood of a valuable answer increases with the number of participants" (Constant et al., 1996; Martins, Gilson and Maynard, 2004; Foutz and Jank, 2010). Having too many contributors can also be problematic. After a certain point, the marginal cost of adding new members exceeds its marginal value. "As the number of contributors grows, the marginal value of additional contributors decreases while the cognitive and coordination costs associated with contributions increases" (Luo et al., 2009). In particular, those involved in the co-creation of content are likely to suffer from information overload as they try to make sense of and respond to others" contributions (Asvanund, Clay, Krishnan and Smith, 2004; Jones, Ravid and Rafaeli, 2004; Ransbotham and Kane, 2011).

Independence	Independence describes a situation when the decision of an individual is not influenced by the decisions of other individuals. Bias is the tendency of individuals and groups to make errors systematically in decision-making situations. "Bias may arise in situations where early participants influence later ones or where the group of participants is not sufficiently diverse to include all relevant perspectives" (Malone, 2009). "In order to eliminate negative social, psychological and other subjective impacts (subjectivity), we must guarantee anonymity of the participants" in online communities" (Norvaišas et al., 2011). "Even a minor social influence can decrease the accuracy of a crowd" (Lorenz et al., 2011). Anonymity guarantees a better self-expression. On the other hand, it also creates an impression of absolute freedom of actions. Losing the control and feeling free to act without any responsibility often may drive towards violation of rights, which belong to other people. (Skaržauskienė et al., 2012).
Transparency and trust	Four main building blocks of co-creation are dialogue, access, risk and transparency (DART model). Transparency of information is necessary in order to create trust between community and society (Prahalad and Ramaswamy, 2004). Trust is an actor's expectation of the other party's competence and goodwill (Blomqvist, 1997). Empirical results of Dabbish et al. (2014) inform that there is a variety of ways that transparency can support innovation, knowledge sharing and community building. However, Morozov (2013) is convinced that information should be distributed in full awareness of the social and cultural complexity of the institutional environment in which it is gathered.
Security and privacy	Communication in social networks is not isolated with possibilities to share personal information with closed circle of persons, thus, at the same time, the possibility for such data to become accessible for millions of people all over the world stays (Štitilis et al., 2012). "Personal data published on social network sites can be used by third parties for a wide variety of purposes, including commercial purposes, and may pose major risks such as identity theft, financial loss, loss of business or employment opportunities and physical harm" (Opinion 5/2009 on Online Social Networking). Joinson and Paine (2009) suggest to reveal the problem of privacy on the Internet through two different dimensions of control: environmental control (connected with the prohibition to access personal information for unauthorized subjects) and control over secondary use of information (connected with the possibility to use once published information secondly only with an individual's knowledge or consent).

Self-organization	Describes "the emergence of order at the system level without central control, solely due to local interactions of the of the system's components" (Kauffman, 1993). "The organization process itself in online communities is autonomous, thus there is no central coordination that manages the organization" (Schut, 2010). "CI is the degree of ability of two or more living things to overcome challenges through the aggregation of individually processed information, whereby all actors follow identical rules of how to participate in the collective" (Aulinger and Miller, 2014). "Collectively intelligent crowd-based organizations such as open source software projects and Wikipedia may be thought to be flat, egalitarian, and self-organizing. However, elected or developed leaders in crowd-based organizations often provide centralized coordination of long-term objectives, mediate conflict within the organization, and develop formal organizational policy" (Dahlandar and O'Mahony, 2010). "Clearly leaders do not simply "arrive" in the collectively intelligent crowds; they are made and developed over time. Commitment, socialization, and mentoring processes are key preconditions for developing potential leaders happen in a social context" (Collier and Craut, 2012). "Groups where a few people dominated the conversation were less collectively intelligent than those with a more equal distribution of conversational turn-taking" (Malone et al., 2012). "The researchers distinguish to types of groups: crowd, where anyone in the large group can take activities, without being assigned by someone in a position of authority; and the hierarchy, group of individuals where someone in authority assigns for other participants to perform the task" (Malone et al., 2012).
Distributed memory system	The shared, often external, dynamic memory system that performs parts of "gents" cognitive processes (Bosse et al., 2006). Distributed memory facilitates communication and coordination between individuals. "Community intelligence is generated upon the shared mental models. The community "mental models" may embody as the shared understandings which basically reside in the community members" minds and which often attribute some degree of intangibility or tacitness; but they can also be exhibited in more tangible forms such as the written norms and regulations" (Luo et al., 2009). The community should contain a memory system that stores information and knowledge, analogous to the memory system in a human brain (Luo et al., 2009). CI may be modeled in a similar way as human brain, with the solutions offered by community users' accessing the generic higher-level of the CI hyper-cortex to find solutions to problems that they encounter (Rodriguez, 2005). Collective Intelligence is a form of universal, distributed intelligence, which arises from the collaboration and competition of many individuals (Levy, 2010).

Task	"CI is the general ability of a group to perform a wide variety of tasks" (Woolley et al., 2010). "Intelligence in groups emerges when each group member evaluates the overall situation and acts accordingly to achieve the overall goal" (Leimester, 2010). "The community task refers to the benefit that the community aims at through the use of the CI system, while the individual objectives refer to the benefit that each user foresees in the use of this system" (Lykourentzou, 2011). CI systems can be further divided into the following categories: collaborative, competitive, hybrid (Luo et al., 2009). To coordinate the CI system, the task is to search for "the best possible balance between the community and individual objectives. The researchers found that centralization – the extent to which one person served as a hub of communication – had a significant impact on individual and group functioning. The complexity of the task proved to be a critical moderating variable: centralization was beneficial when the task was simple and detrimental for complex tasks. A decentralized structure was best when information was distributed unevenly among group members, or when the information was ambiguous" (Leavitt, 1951; Shaw, 1971).
"Wisdom of crowd" effect	Describes "a rise of system level properties that are not present in its components: "the whole is more than the sum of its parts"" (Damper, 2000). "The community should commonly exhibit higher-level intelligent capability than any community member" (Luo et al., 2012). "Wisdom of crowds" is derived not from averaging solutions, but from aggregating them. For example, the average of several individuals "estimates can be accurate even if individual estimations are not" (Surowiecki, 2005). "Individuals interacting with each other form a complex adaptive system, which shows self-organization and emergence" (Salminen, 2013). "The knowledge network embodies the collective knowledge of the community and consist of a technological network or media network that supports information and knowledge transfer, a human network of community members, and a content network of knowledge and information which is hosted in humans and computer systems" (Luo et al., 2012). "Incorporating all sorts of computing and information processing technologies (e.g. the Semantic-Web-based reasoning tools, Web Services and other Web-based applications), the Web platform has obtained some capability of intelligence in its own right, and such Web intelligence may be furthermore combined with participants" human intelligence to form higher-level community intelligence" (Zhong et al., 2003). According to Boder (2006), CI emergence is composed of three building blocks: competencies development, goal development and mechanics development.

Adaptivity	Describes "the ability of a system, or its components, to change themselves according to changes in the environment" (Schut, 2010). Schut (2010) distinguishes enabling and defining properties of CI. The existence of enabling properties, such as adaptivity, interaction and rules executed at a local level, make it possible for Collective Intelligence to emerge from a system ("how do we build CI systems?").
Sustainability	"Identifies whether the project have created new infrastructures that continue to have impact" (Skaržauskienė and Pitrėnaitė, 2013). "By focusing on access at multiple points of exchange communities can broaden their opportunities creating good experiences" (Prahalad and Ramaswamy, 2004).
Motivation	"No matter how well designed a CI system may be, if it is not eventually used by the community that it is targeted at, then it will not be able to increase their collective capabilities. The incorrect identification of the proper user motivating factors is one of the most important launch failure causes of a new CI system" (Malone et al., 2009; Lykourentzou, 2011). "Upon designing a CI system, it is important to create the appropriate incentive-based mechanisms that will motivate users to participate. The incentives promoted to users may be extrinsic such as monetary compensation" (Calder and Satw, 1975), or intrinsic, such as the self-fulfillment motivator (Malone et al., 2009) and social recognition incentives (Wasko and Faraj, 2005). "Although the financial incentive is expected to produce more prompt results, however, the incentives of intrinsic motivation seem to be more self-sustained" (Osterloh and Frey, 2000). Authors (Malone et al., 2010) argue that money, love and glory lead people to participate in the CI system. "Five new collective genes were needed to expand the Malone Model to describe public ventures: self-interest, civic duty, evaluate, feedback public and feedback not public" (Wise, Paton and Gegenhuber, 2012).
Social problems monitoring (identification)	Identifies whether community resources are allocated to map needs and identify opportunities for social innovation (Spila et al., 2012). Social sensitivity describes the degree to which "group members were attuned to social cues. CI is correlated with the average social sensitivity of group members and the equality in distribution of conversational turn-taking" (Malone et al., 2012). The emergence of CI is also correlated to the proportion of women in the groups. According to Woolley et al. (2013), "much of this effect can be explained by the gender difference in social sensitivity: women tend to have more of it".
Culture and value for society	The building block of CI is the development and alignment of processes into mechanics of interaction participants that draws from the communities" culture and its formal and informal norms (Boder, 2006). CI systems "contribute to the society not only by generating creative solutions to social and scientific problems but also by building tools that augment human cognition and promote intellectual growth" (Yu et al., 2012).

Source: developed by the authors (2014)

To sum up the theoretical part of the monograph, it can be concluded that CI emergence is confirmed by the fact that a community demonstrates higher intellectual abilities than any individual member. Community's intellectual abilities may include new knowledge, new ideas, adopted decisions, proposed problem solutions, formed public opinion, structured opinions and positions, introduced innovations and prototypes, the generated value added, etc.

Theoretical insights lead towards a formulation of 10 hypotheses to identify criteria determining the potential of the Collective Intelligence. The following hypotheses will be analysed and tested in the course of further empirical research:

H1. CI system has the potential for CI emergence when the system is open, dynamic and flexible.

H2. CI system has the potential for CI emergence when it demonstrates the capacity for creating collective knowledge.

H3. CI system has the potential for CI emergence when it demonstrates the capacity for independent decision-making and collective problem-solving.

H4. CI system has the potential for CI emergence when it demonstrates competencies for transparent self-organisation.

H5. CI system has the potential for CI emergence when the system has the capability to attract critical mass of contributors.

H6. CI system has the potential for CI emergence when it offers security and privacy in the network.

H7. CI system has the potential for CI emergence when it demonstrates a balance between the task of the community and participants.

H8. CI system has the potential for CI emergence when it demonstrates adaptivity to socio-cultural context.

H9. CI system has the potential for CI emergence when the motivating factors are correctly identified and appropriate mechanisms to motivate the users created.

H10. CI system's potential is related to the quality of technological solutions in the network.

Hypothesis H6 was explicitly analysed in Chapter 4.3 and confirmed in the course of the quantitative research. Hypotheses H1, H2, H3, H6,

H7, H8 and H9 were partly or directly confirmed in the course of the quantitative research. All these hypotheses were also analysed in the course of the qualitative research. Hypotheses H4, H5 and H10 were tested and partly confirmed in the course of the quantitative research

Analysis of scientific sources allowed identification of the importance of online community's social maturity to the development of the CI potential. Many authors emphasize the importance of the impact upon the society, social orientation and motivation, involvement and participation in social activities, reputation index and other factors in raising community's intellectual capital. The limited scope and duration of the present research has precluded the formulation of hypotheses on the impact of social maturity upon CI development. Insights about the aforementioned factor have been confirmed on a theoretical level and may become the subject of future empiric research.

4. ONLINE COMMUNITY PROJECTS IN LITHUANIA: OPPORTUNITIES, CHALLENGES AND RISKS

The aim of this part is to identify social ties of the internal actors in online community projects in Lithuania and to evaluate their internal and external communication activities. Qualitative research seeks to deepen and develop further knowledge about the processes taking place in the initiation and implementation of online community projects, particular features of CI, its main characteristics and factors and barriers fostering or preventing CI emergence. The quantitative research supported by scientific experiment identifies the main social, managerial obstacles and legal presumptions, challenges and risks (privacy, censorship and restrictions) influencing the emergence of CI in networked structures.

4.1. Exploratory Evaluation of Online Community Projects in Lithuania

To deepen the hypotheses on the peculiarities and preconditions for the CI development, a scientific experiment was launched alongside with the quantitative and qualitative research. During the first stage of the experiment (the exploratory stage), the researchers used certain criteria to compile a list of societal projects (the list was revised on the basis of the data collected during quantitative and qualitative interviews) and observed selected community projects in their natural environment in accordance with the designed survey scheme (representative parameters). The research sample was set-up according to these criteria:

- Lithuanian origin of communities;
- Communities have specific goals;
- Communities have capabilities to involve masses (a large number) of members;
- The sample must include both member-initiated and organization-sponsored projects;
- The sample must include communities of various orientations (e.g., social, professional, commercial, non-profit and governmental).

At the onset of the exploratory stage, the researchers conducted a natural experiment with no direct interference into activities of the researched online communities. The observation results underwent qualitative analysis in the context of civic engagement, regulatory framework as well as innovation management, and are presented in chapters 4.1.1., 4.1.2., 4.1.3.

4.1.1. Civic Engagement and Networked Society in Lithuania

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One of the flagship initiatives of Digital agenda for Europe aims to create single digital market based on fast/ultrafast Internet and interoperable applications. As the response to that challenge, Lithuania started RAIN I and RAIN II projects carried out by absorbing EU structural support. Owing to Rural Internet Access Points (RIAPs), the fast and high-quality Internet became accessible not only in cities but also in public sector, business organizations and residents or rural areas. It is planned that by the end of 2015, broadband Internet will reach 98.7 percent of rural areas in Lithuania. There is no doubt that the widespread and availability of the Internet is one of the prerequisites for a new form of interconnection, different forms of social cohesion and conditions to collectively build community interactions. "High-speed broadband has the potential to fundamentally alter communication practices within the community […] influence transformation of culture and society" (Institute for a Broadband-Enabled Society, 2013).

"As people multiply their abilities to organize themselves through social technologies, there is the possibility to effect positive change in communities and governments" (Malone, 2012). Social technologies could also help communities collaborate in political and non-political ways, such as voting, organizing disaster aid, decision-making for community and government. This potential could be especially relevant in societies with relatively short extent of participation of society in public life and in public policy making process, in particular. However, Lithuanian society encounters a social challenge – Lithuania remains a state where civic

engagement is poor due to numerous socio-cultural reasons and post-soviet mentality. The researches that have been conducted by Civil Society Institute since 2007 exhibit a low level of the society's political self-awareness – in 2012, the civic engagement was rated in average 38,4 of possible 100 points (Civil Society Institute, 2013). Since 2007, this rate has been very slightly increasing. It is worth mentioning that civic engagement of young people (from 15 to 29 years old) is distinguished as being significantly low. It is notable that only an insignificant part of young people participates in the activities of local communities (in 2010, only 26 percent of young people participated in them). The problem of civic engagement of young people has been identified by the research of civic engagement of 16-24 year-old people. In accordance with the findings of the research of 2009, only 45 percent of the youth of the above mentioned age were socially active, i.e., they participated in the activities of at least one organization or in municipal institutions. The social environment for civic engagement in Lithuania was rated by 22.2 of 100 points in 2012 and was revealed to be adverse. 6–7 out of 10 individuals have a negative opinion on participation environment. The research results proved the necessity to search for different tracks that could contribute to stimulation of civic engagement. As a progressive means to tackle this issue is employment of social media.

The Web's growth in reach and capability set the stage for the explosive growth of networked projects in Lithuania, funded by public organizations or private entities. Among them are such projects as *manobalsas.lt* (My Voice, www.manobalsas.lt), *manoseimas.lt* (My Parliament, www.manoseimas.lt), eVoting testing system *ivote.lt* (www.ivote.lt), Lithuanian civic initiative think tank *Aš Lietuvai.lt* (*I for Lithuania*, www.aslietuvai.org), the platform for e-democracy *Lietuva2.0.lt* (*Lithuania2.0*, www.lietuva2.lt), etc.

According to the project developers of *MyVoiceLT,* it is a rational voting system on the Internet that uses questionnaires on public issues. People are invited to make a short test to find out which politicians and political parties are closest to their political views. Questionnaires cover questions based on public interest issues from a variety of areas – education, health, economy, foreign policy and culture. It is believed that people, knowing politicians position toward issues that concern them, can make a rational decision what politician will represent their interests the best. At the same time, the project contributes to the strengthening of democracy in the country, civil society development, populism reduction,

encourages people to vote responsibly and activates interest in politicians" attitudes and political parties programs. Another project implemented by *Transparency International Lithuanian Chapter* and a group of active citizens of Lithuania, *My Parliament LT*, is dedicated for those, who care about the work of MPs and parties what are their positions on important state issues. Test basis includes 10 themes, which have been voted at the Parliament during the last 2008-2012 years term.

Both *My Voice LT* and *My Parliament LT* apply the same questionnaire. However, there is a significant distinction between them. The results of peoples" voting in *My Voice LT* are compared with those of the candidates for MPs, whereas *My Parliament LT* voting is based on standpoints of actual MPs. Thus, *My Parliament LT* displays actual positions of MPs, whereas *My Voice LT* allows revealing voices not only of the parliamentary parties, but also of the others. The project *iVote.lt* is aiming to introduce citizens to a new Internet voting method and to allow them experiencing the method themselves. *iVote.lt* game model is based on an online voting model used in Estonia and adopted with attitude towards specifics of Lithuania. When designing voting game, global online voting practice was studied and consultations with experts in fields of law, information technologies and elections were conducted.

Based on groups in Google and Facebook, a new online community called *Aš Lietuvai.lt* (*I for Lithuania*, www.aslietuvai.org) was created. This project strives to find original ways to tackle national problems and it is organized in the way that people propose ideas and solving of problems, participate in leading these ideas to practical application. At the moment, this community is implementing public Senate idea. Another notable idea in the process is the creation of positive Internet TV (equivalent to www.tvrain.ru). Many other ideas will be studied in the next chapter.

In January of 2011, an online community project called *Lietuva 2.0.lt (Lithuania 2.0,* www.lietuva2.lt) was launched. It is identified as a social network of e-democracy, a platform for socially active individuals aiming to contribute to the development of Lithuania. *Lithuania 2.0.lt* provides means for society to get involved in public life of the country by presenting ideas, voting, discussing and compromising proposals for Lithuanian legislation.

Initial analysis of features of the online community projects was performed. They are presented below within Lesser's et al. (2012) areas for

exploring CI in community management (Table 16). This analysis allowed defining which projects serve as the best platforms for the development of CI.

Table 16. Analysis of Lithuanian online community projects as platforms for CI

Online community project / Areas for CI	My Voice LT	My Parliament LT	iVote.lt	I for Lithuania	Lithuania 2.0
Generation of new ideas for value creation	No	No	No	Yes	Yes
Innovative distribution of work	No	No	No	Yes	Yes
Contribution to decisions about the future	Yes	Yes	Yes	Yes	Yes
Aggregation of knowledge	No	No	No	Yes	Yes
Targeting and motivating participants	Yes	Yes	Yes	Yes	Yes

Source: developed by the authors (2013)

The rough analysis demonstrates that some of the online community projects are more sophisticated as platforms for CI than the others. *My Voice LT*, *My Parliament LT* and *iVote.lt* contribute to the recognition of public perceptions of social problems, foster civic engagement and educate people about Lithuanian political life. However, these projects are lacking such important attributes as possibilities to concentrate new ideas, attract and share knowledge and distribute work in new and innovative ways. Meanwhile, *I for Lithuania* and *Lithuania 2.0* contain all the features for the development of CI. Therefore, these online community projects are selected for a more detailed analysis.

The authors of this chapter analyzed *I for Lithuania* and *Lithuania 2.0* according to aspects and components of CI which were listed in academic literature (see chapter 2.1. "Defining Collective Intelligence"). In total, 11 components were identified, according to which qualitative analyses of the online community projects were accomplished (see Table 17).

Table 17. The components of Collective Intelligence in *I for Lithuania* and *Lithuania 2.0*

Component of CI	I for Lithuania	Lithuania 2.0
Social network of individuals and organizations	Any individual or organization can join the project. Currently, more than 10 NGOs and other public institutions are connected to the project. Acceptance of the unique code of ethics is required.	Any individual or organization can join the project. Currently, more than 10 NGOs are connected to the project. Acceptance of the rules of privacy and directions for use is required.
Strategic community	This online community identifies itself and sets the mission – to collect wisdom of crowds for tackling ultimate social issues in Lithuania.	Identifies itself as a network that strives to find solutions for social problems in Lithuania.
Policy frameworks	*I for Lithuania* strives to influence policies via collecting, analyzing and implementing ideas. Ideas are allocated to several levels: global value level, national (state) value level, organization or community value level and individual value level.	*Lithuania 2.0* strives to influence policies via collecting, analyzing and implementing ideas.
Socio-technical network	*I for Lithuania* – online community project consisting of people that communicate using social technologies. For participation in the project, hardware, software and Internet connection are required. Google sites, Facebook, Google docs, Twitter, etc. are employed to facilitate the project activities.	*Lithuania 2.0* – online community project consisting of people that communicate using social technologies. For participation in the project, hardware, software and Internet connection are required.
Self-organizing innovation network	Open innovations are the essence of *I for Lithuania*. Up to date, about 5000 ideas, including innovative ones, were proposed, voted and discussed. Working groups focusing on specific ideas are being composed of these ideas joining people.	Innovative ideas are expected to arise within conceptions proposed for discussions at *Lithuania 2.0*. However, the main focus is not on innovation, but on *relevance to Lithuanian society. People are free to join any conception that is developed within the network.*

Social interaction, familiarity and interpersonal trust	People interact while discussing issues, voting and commenting on ideas. The registered Facebook users participate in the network. People recognize each other via profiles. Trust is built on believing that users follow the code of ethics that is accepted during the enrolment to the network.	People interact while discussing issues, voting and commenting on ideas. The registered users participate in the network. Applicants are asked to motivate the striving to participate in *Lithuania 2.0* and describe their competences. Users can remain anonymous, but the network leaders publish their CV. Trust is built on believing that users follow the manifest, users' requirements and privacy guidelines that are accepted during the enrolment to the network.
Group cohesion, strength of relationship	The online community project gains attributes of civic movement. A number of users connect to some idea and work for its development.	*Lithuania 2.0* unifies socially active people for common goals. A number of users connect to some idea and work for its development. Devotion to the ideas is expected and it is set in the manifest.
Diversity	Vast of micro projects. Some of the ideas that are being developed by *I for Lithuania* include the following: strategies for Lithuania; crisis mapping; 9 Lithuanian principles; matters of survival; untouchable priority; the Solidarity Charter; success factor; Lithuanian equation; reverse creation; successful nation; open television, etc.	Various ideas, diverse voting. Some of the current problems that are being solved by *Lithuania 2.0* are the following: alcoholism reduction; waste management; improvement of election system; contract on candidate's political responsibility; implementation of national e-learning system for schools, etc.
Self-managing teams, collaborative leadership or distributed leadership, and shared governance	People join the group elaborating some specific idea in an informal, non-hierarchical manner. The moderator is selected to lead the group. However, during the idea development process, leaders could change.	The platform is filled up with contents by registered *Lithuania 2.0* users. Those are considered to be both managers and leaders, as well. The more active some user is, the more rights in the network he gains.

Inter functional linkages	One of the basic projects of *I for Lithuania* is creation and employment of public Senate. House of Lords and House of Commons are established for laws making. Several actions are linked until ideas become an Act: work in groups on some idea, preparation of documents, formal presentations, readings and debates, consideration in committees, reporting and assent.	Processes of presentation of ideas (or conceptions), explanation of problems, introduction of solutions, discussions, evaluation and voting for or against ideas and solutions are interlinked.
Collaboration and competition of many individuals	Several hundred of *I for Lithuania* participants are counted residing in different countries. They compete when present ideas and collaborate when elaborate alternatives for problem-solving.	Currently, *Lithuania 2.0* is joined by about a hundred participants competing in introduction of ideas and collaborating in searching the ways to tackle social problems.

Source: developed by the authors

The preceding cases demonstrate the growth of CI by linking socially active people through social media. Both *I for Lithuania* and *Lithuania 2.0* contain all the most important features for CI building, such as self-organization, shared management, innovations, social interaction, collaboration, etc. Furthermore, if we screened these online communities from the point of genome of CI (Malone, Laubacher and Dellarocas, 2009), we could state that:

- Both networks have set very clear missions and goals; that answers to the question "*What* is being done?" are explicitly given;
- Neither *I for Lithuania*, nor *Lithuania 2.0* have limited who can participate in activities ("Who is doing it"?). As the general public is invited, there is a possibility to engage people with diverse knowledge and skills;
- Contributors take part in the activities because of the opportunity to socialize, they can feel motivation to contribute to large goals, people can also be inspired by possibility to be appreciated ("*Why* are they doing it?");
- Participants know the way CI will be used ("*How* it is being done?"). Both networks strive to reach some positive result in social problem-solving. To find possible solutions, different group decision-making methods are applied, such as voting, contest, averaging and consensus, or a team decides on a solution. Thus, contributors know that their efforts will not be lost.

When comparing *I for Lithuania* to *Lithuania 2.0,* it is obvious that the first one is much more complex in its contents as well as in its extent in terms of the number of participants. On the one hand, expansive characteristics of *I for Lithuania* exhibit its popularity, recognition and belief that this online community could stimulate positive social changes. On the other hand, such complexity aggravates operation of the network, requires from new participants lots of time and efforts to understand the processes within the network, a number of promising ideas could be lost in vast of information, whereas *Lithuania 2.0* is simpler, easier to understand and find information, follow ideas. However, *Lithuania 2.0* is a very new platform and it holds a potential of expansion.

This research could be valued as an introductory phase into the subject because it reveals the facts of growth of CI in social networks. Yet, there is no clarity how institutions of government could use Collective Intelligence to solve public problems. Research on stakeholders" involvement in policy making in Lithuania demonstrates failings in application even of the "classical" participatory instruments, such as formal participatory decision and/or problem-solving groups, committees and commissions, etc. (i.e., Pitrėnaitė-Žilėnienė and Mikulskienė, 2012; Mikulskienė and Pitrėnaitė-Žilėnienė, 2012). Both Lithuanian policy makers and participatory policy processes unlikely are ready to employ ideas developed in social networks. Therefore, the question of the introduction of CI results to public policy making remains to be answered by further research.

4.1.2. Regulatory Framework for Civic Engagement in Lithuania

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The beginning of the 20th century could be treated as the golden age of Collective Intelligence as the technological progress enabled to implement crowd decisions and direct democracy, need of which was

mentioned even in the ancient times, at minimal costs. Social technologies eliminated distances, enhanced the access to the participation in different organizations, created the prerequisites and space for every individual to express their opinion and united large groups of people via social networks. While observing the scope of the use of social technologies and having evaluated their possibilities, it becomes evident that nowadays a wide use of Collective Intelligence is accessible like never before. Owing to the fact that in all societies more efficient solutions are a socially desirable phenomenon, the use of Collective Intelligence in different spheres is necessary and it should be further encouraged.

The term "Collective Intelligence" has been thoroughly explained in other chapters of this monograph. During the preparation for the analysis of legal prerequisites, the CI genome model by T.V. Malone, R. Laubacher and Ch. Dellarocas will be used (Malone, Laubacher and Dellarocas, 2009). The model is explained in chapter 3.3. of this monograph. This model is a suitable point of reference in the search of possibilities to use social technologies generating Collective Intelligence in the sphere of civic engagement in the decision-making process. In this chapter, three of four elements of the genome of Collective Intelligence will be investigated: *Who is doing this? What is being done? How is this being done?,* as they are most closely connected with certain regulation without which it would be impossible to refer to the formation of Collective Intelligence in the sphere of public administration due to its predominant method of imperative regulation. Gradual answers to these questions will crystallize those forms which are stipulated in the legislation regarding civic engagement into the decision-making process. Such forms have the potential to generate Collective Intelligence (engagement of groups of individuals) and their application needs a two-way communication. The answer to the third question will clarify whether the present legislation sets the possibilities for civic engagement to use social technologies which are being used as a medium by online communities.

Table 18. Generalization of legal prerequisites in accordance with the CI genome

Component of CI genome	Legal prerequisites
A. What is being done?	Legal regulation of civic engagement in the decision-making process: Legal regulation of the aims of civic engagement in the decision-making process (not covered by the research); Execution of statutory requirements of civic engagement in the decision-making process.
B. Who is doing this?	Individuals (production of individual intelligence); Groups of individuals (production of Collective Intelligence).
C. How is this being done?	Possibilities of the use of social technologies by individual intelligence; Possibilities of the use of social technologies by Collective Intelligence.

Source: developed by the authors

Forms of civic engagement into the decision-making process in the legislation of the Republic of Lithuania. While generalizing the information presented in this chapter, it should be noted that the genome of Collective Intelligence, suggested by the researchers form the USA, reveals the properties of social technologies generating such intelligence. While investigating legal prerequisites of civic engagement into the decision-making process, the following chapters will systematically deal with the answers to the three chosen genome questions: *Who is doing this? What is being done? How is this being done?* Gradual answers to these questions will crystallize those forms which are stipulated in the legislation regarding civic engagement into the decision-making process. Such forms have the potential to generate Collective Intelligence (engagement of groups of individuals) and their application needs a two-way communication. The answer to the third question will clarify whether the present legislation sets the possibilities for civic engagement to use social technologies which are being used as a medium by online communities.

Every democratic state encourages direct engagement of the members of its society in the decision-making processes as the dialogue and partnership between state institutions and citizens in making decisions provide the basis for the development of civil and democratic society. Although at present there are numerous forms of civic engagement in the decision-making process, unfortunately, an insignificant part of them are actually used in practice.

The main provision entrenched in the Constitution of the Republic of Lithuania, related to civic engagement into the decision-making process, is the provision of Article 2, contending that *sovereignty belongs to the nation.* The Constitution of the Republic of Lithuania also has such entrenched forms of civic engagement into the decision-making process as the right to elections and of petitions (Article 33), the right of legislative initiative (Article 68), the right of referendum (Article 9) and the right to form associations (Article 35). It should be contended that undoubtedly only the essential principles regarding civic engagement in the decision-making process are entrenched in the Constitution. They are further detailed in different laws and secondary legislation which stipulate the ways, means and procedures to ensure this process.

The main principles of civic engagement in the decision-making process entrenched in the Constitution of the Republic of Lithuania at the legislative level are detailed by a significant number of various laws, the most important being the Law on Elections to the Seimas, the Law on Elections to Municipal Councils, the Law on Political Parties, the Law on Associations, the Law on Religious Communities and Associations, the Law on Meetings and the Law on Petitions which specify such forms of civic engagement in the decision-making process as elections, petitions, referenda (including local population surveys), legislative initiative and associations. A number of laws stipulate other forms, not entrenched in the Constitution. The following laws should be mentioned: the Law on Legislative Framework, the Law on Public Administration, the Law on Territorial Planning and the Law on Local Self-Government. Furthermore, this legislation regulates the issues related to public opinion while solving regular questions of state governance (consultations).

The process of civic engagement in the decision-making process is probably most thoroughly elaborated in the spheres of local self-government and territorial planning. Provisions regarding civic engagement in the decision-making process play a significant role in the principles of self-government stipulated in the Law on Local Self-Government. Article 4 Section 8 of the aforementioned law entrenches the principle of agreement of interest of community and individuals of the local government. Article 9 of the same law declares the principle of engagement of local community in public affairs of their local government: *"Institutions of local self-government shall create the prerequisites for the direct participation of the citizens of*

the municipality in the preparation and consideration of draft resolutions, organization of surveys, meetings or public debates on petitions and shall encourage other forms of civic initiative". This law rather comprehensively stipulates the institute of the survey of local citizens which deals with local citizens" opinions on public affairs of the local government. Systematic evaluation of this institute could define it as a form of referendum as in such case the residents of a certain municipality are able to express their opinion on several issues important for that region. In accordance with the Law on the Territorial Administrative Units of the Republic of Lithuania and their Boundaries, surveys of local residents and their results are also an important prerequisite for the Seimas to establish, annul or change the municipal boundaries and centers. However, the procedure of a survey is essentially a form of civic engagement in the decision-making process which produces individual intelligence as peremptory norms of laws set the requirements ensuring that the opinion should be presented by an individual resident of a particular area.

The Law on Territorial Planning stipulates the necessity to include the public into the process of territorial planning. Article 32 of the aforementioned law entrenches the responsibility of an organiser of planning to analyze submitted proposals and to present reasoned responses. This law, however, provides only for general requirements concerning civic engagement, while the detailed procedure is regulated by the provisions of Public Information and Public Participation in Spatial Planning Procedures approved by the Government. The analysis of the last set of legal acts – secondary legislation – will be started with a concise overview of this by-law. This by-law stipulates several forms of civic engagement in the decision-making process: presentation, public exposure and public meeting. In addition, it shall provide for the possibility for the public to submit proposals in writing which the organiser of planning shall be obliged to analyze.

Moreover, some other secondary legislation sets forth the possibilities of civic engagement in the decision-making process. The following legal acts, adopted by the Government, should be firstly mentioned: the Procedure for Surveys of Local Population, the Procedure for Informing the General Public about the Environment, the Procedure for Public Awareness and Participation in the Preparation of Plans and Programmes for Management of Environmental Protection of Air, Water and Waste, as well as other legal acts which will not be dealt with due to the scope of the research.

In conclusion, it should be noted that, having systematically analyzed the forms of civic engagement in the decision-making process entrenched in the legal acts of the Republic of Lithuania, five forms of civic engagement in the decision-making process are used in the country: elections, petitions, referendum (including local population surveys), legislative initiative and consultation which in the context of this research is perceived in the broadest meaning of the word as a form of civic engagement in the decision-making process which initiates a dialogue between the population and the state or decision-making officials of the local government.

A. Civic engagement in the decision making process: Who is doing that?

While searching for legal prerequisites for civic engagement in the decision-making process it is imperative to answer the question: *Who is doing that?* Regarding this research, the question should be answered in the context of whether individuals or groups are included in the decision-making process in a particular case.

Table 19 demonstrates the authors" generalization of the identified forms of civic engagement in the decision-making process, the nature of participation as well as the main legal acts stipulating a concrete form of civic engagement.

Table 19. Generalization of the forms of the decision-making process, the nature of participation and legal regulation

Form of civic engagement in the decision-making process	Nature of participation	Legal regulation
Elections	Individual	The Constitution of the Republic of Lithuania, the Law on Elections to the Seimas, the Law on Elections to Municipal Councils, etc.
Legislative initiative (including referendum initiative)	Collective	The Constitution of the Republic of Lithuania, the Law on Legislative Initiative of the Citizens, etc.
Referendum and local population surveys	Individual	The Constitution of the Republic of Lithuania, the Law on Referendum, the Law on Local Self-Government, the Law on Territorial Planning, etc.
Petition	Individual/ Collective	The Constitution of the Republic of Lithuania, the Law on Petitions, etc.

Consultation (including presentation, public debates and submission of answers to questions)	Individual/ Collective	The Law on Legislative Framework, the Law on Local Self-Government, the Law on Territorial Planning, the Law on Public Administration, etc.

Source: developed by the authors

From the information presented in Table 19, it is clear that elections and referendum (including local population surveys) are forms of personal participation; hence, individual intelligence of a person expressing his will is used while applying them. This leads to inexpediency of further research of these two forms. Legislative initiative and the activities of associations are the forms which produce Collective Intelligence as the will and intellectual efforts of individuals of a certain group are vital for their realization.

Other forms are of a dual nature, i.e., under certain conditions, groups of individuals participate, while in other cases only individuals are involved. For instance, under the Law on Petitions of the Republic of Lithuania, a petition can be presented by *a citizen of the Republic of Lithuania, not younger than 16 years of age, or a foreigner permanently residing in the Republic of Lithuania, or a group of such citizens or foreigners, who has written and presented an application (petition).* Thus, either a natural person or a group of them are entitled to present a petition.

Before presenting the analysis of the consultation form, it should be noted that this form of civic engagement in the decision-making process is differently perceived or called in the legal acts of the Republic of Lithuania. In the context of this research, consultations will be understood in the broadest meaning and will include separate procedures, such as information, presentation, submission of proposals, public discussions, etc. Such a decision was determined by the identification that the concept of consultation is not systematically and consistently used, it is frequently split into separate procedures which essentially are constituent parts of the consultation procedure. In the present research, consultation will be understood as a number of procedures, during which a dialogue between society and the state or decision-making officials of local government takes place in different ways (except the aforementioned forms of civic engagement in the decision-making process).

In case of consultation, both individual and Collective Intelligence can be produced as there are no requirements for the subjects concerning

participation in procedures, such as public meeting on the consideration of territorial planning documents or submission of proposals for public inspection of draft laws. However, it is notable that, in case of this form of civic engagement, groups of individuals have a potential to be more active as in many cases the proposals, submitted by a group (in comparison with individual initiative), are more frequently analyzed.

The right of legislative initiative is an exceptional form of collective participation due to the fact that separate individuals do not have any possibility to present legislative proposals; it is the prerogative of the Seimas. In accordance with the legislation, this right is to be exercised only by 50 thousand Lithuanian citizens having universal suffrage and, pursuant to the Constitution of the Republic of Lithuania, by not less than 300 thousand electors striving to amend or supplement the Constitution of the Republic of Lithuania. A separate individual cannot even show legislative initiative as Article 6 of the Law on Legislative Initiative of the Citizens stipulates that only an initiative group (not less than 10 persons having universal suffrage) is entitled to submit proposals for amendments of legislation or the Constitution.

In conclusion, it should be noted that, having scrutinized the subjects whose participation is encouraged by different forms of civic engagement in the decision-making process, it was established that elections and referendum presuppose possibilities to merely express an individual's opinion, while groups of individuals have the possibility of legislative initiative. Other forms could be used both by individuals and groups of citizens.

B. Civic engagement in the decision-making process. What is being done?

The second question is *What is being done?* In order to have a precise answer to this question, it is not sufficient to mention that "the public is engaged in the decision-making process". The answer could be related to the following aims of civic engagement: development of ideas of citizenship, direct democracy and social compromise, etc. On the other hand, there could be formal reasons, i.e., execution of statutory requirements. In the context of this research, a narrower meaning will be taken into consideration, thus eliminating ideological provisions of the concept of the rule of law and paying attention only to statutory requirements of civic engagement in state governance. In the present section of the research, the authors, having

analyzed such forms of civic engagement in the decision-making process which have the potential to produce Collective Intelligence, in order to answer the question *What is being done?,* are seeking to analyze the contents of the forms entrenched in legal acts.

Table 20. Civic engagement in the decision-making process

Form of civic engagement in the decision-making process	Result (drafting/ decision) of engagement	What is being done?
Legislative initiative (including the right to initiate referendum)	Drafting	Submission of a draft law to the Seimas for consideration
Petition	Drafting	Appeal to competent authorities requesting to amend the present legal regulation or to adopt new necessary legal provisions
Consultation	Drafting	Dialogue between state institutions and the public

Source: developed by the authors

It is manifest from Table 20 that while using all the forms the public has a possibility to create certain variants of required decisions. While commenting on the results presented in the table, regarding legislative initiative, it should be noted that, having analyzed the Law on Citizens" Legislative Initiative, it can be contended that it stipulates the right of a group of citizens to present a draft law. Undoubtedly, not always will a presented draft law be the result of collective efforts; however, legal prerequisites for such initiative have been created.

Regarding petitions, there also is a certain creative result, i.e., *a petition,* which in the Law on Petitions is defined as "*a petitioner's written or electronic application addressed to the Seimas, the Government or the municipal government and administrative institutions, which contains demands or proposals to resolve the issues specified in Paragraph 1 of Article 3 of this Law, the resolution of which may require that a new legal act be passed, an effective legal act be amended, supplemented or declared invalid, and which the petitions commissions recognise as a petition*". A petition, as the result of intellectual activities, could be drafted both by an individual and a group of individuals; thus, in this case, there also is some space for the production of Collective Intelligence.

The consultation procedure, as it is perceived in the context of this research, has a potential to make new decisions, better corresponding to the needs of society. It should be noted that in its essence, this form of civic engagement in the decision-making process, being wide and covering the efforts of initiating different dialogues between state institutions and society, presents a possibility to use synergistic effects provided by Collective Intelligence. It is insured by the dual nature of communication. In the case of previously analyzed forms, communication is one-way: the public presents a document, as a result of intellectual activity, while the other side, state institutions, considers or rejects it.

C. Civic engagement in the decision-making process: How is this being done?

Civic engagement in the decision-making process is universally treated as a socially desirable phenomenon (Skaržauskienė, Pitrėnaitė-Žilienė and Leichteris, 2013). However, the implementation of this process presents considerable difficulties. In order to explain this, the following arguments are used: civic engagement is very expensive (e.g., in Lithuania, the expenses of a referendum would be 15 million Lt (Stanišauskas, 2011)) and the public is not very active (Vipartienė, 2013). However, public activity in social networks is considerably large (e.g., in accordance with *Socialbaker.com* data, in Lithuania more than 1 040 000 people use Facebook (Gimžauskas, 2012)).

The situation is rather paradoxical as people are active in social networks, while in the participation of political processes they are passive. This dilemma dictates a problematic issue: the authorities do not receive civic engagement as they do not offer such social technologies for social expression which are used by the public. At the present stage of the research, the organization of the process of civic engagement will be identified. In the context of this research, the answer to the question *How is this being done?* will be analyzed with the help of systematic evaluation of the statutory requirements for the implementation of legislative initiative, presentation of petitions and consultation. It is at this stage that the possibilities to apply social technologies for these forms will be evaluated.

Table 21. Possibilities for civic engagement in the decision-making process

Form of civic engagement in the decision-making process	Regulation of procedure (independently/ dependently)	How is this being done?
Legislative initiative (including the right to initiate referendum)	Dependently	Direct participation (signature)
Petition	Dependently	Direct participation (signature) or electronic presentation of an application using an electronic signature
Consultation	Dependently	No peremptory requirements have been set

Source: developed by the authors

Firstly, it is important to evaluate whether the procedures that are carried out are independent or dependent on external regulation (in this case, on legislation regulating a concrete process or on the requirements of normative character set forth in by-laws adopted by state institutions). It should be noted that there are two dimensions in civic engagement in the decision-making process. The first form of the aforementioned ones is a form of expression of will (i.e., how the process of civic engagement of a concrete society in the decision-making process takes place), while the second form is independent of the addressee of intelligence product which is being prepared, as in some cases the product is being prepared by the public (e.g., a draft law) and only its final variant is presented to the decision-making institution. Hence, the research has to be carried out in two directions. The first one is the evaluation of procedure of the statutory form of civic engagement. Next, in case of the form of one-way communication of civic engagement, it is necessary to take a separate procedure of creation of intellectual product into consideration. However, due to the scope of the research, in this article this segment will not be analyzed as it is not regulated by law.

The aforementioned insights precondition the fact that all the forms of civic engagement in the decision-making process are identified as dependent on the requirements entrenched in legislation and other legal acts.

In case of legislative initiative, having systematically analyzed the Law on Citizens" Legislative Initiative, it is obvious that legislators do not stipulate any possibilities for the public to implement this form of engagement using social technologies. It is illustrated by such provisions as the requirement to present an application of an initiative group to the

Chief Elections Commission in writing as well as the requirement to collect signatures of people supporting the initiative in special sheets. While implementing this form of civic engagement in the decision-making process, this law does not offer the aforementioned possibility to use social technologies which would undoubtedly accelerate the process and make it more accessible to the individuals who support the initiative but due to various reasons cannot physically sign on a special sheet.

In case of petitions, the situation is more favourable for the use of social technologies. The Law on Petitions specifies that a petition could also be an electronic application of an applicant. Article 4, stipulating the form and contents of an application, explains that *"an application has to be presented in writing or electronically"*. It also stipulates that *"an application presented in electronic form should be signed electronically"*. Thus, legislators allow an individual to present a petition in a rather modern way; however, this way does not include an application presented by a group of applicants as an electronic signature identifies only a concrete natural person. If a petition were to be drafted by an online community, its presentation would be rather complicated as it would be necessary to elect a representative and to authorize him to sign an application. However, it does not preclude engagement of online communities; therefore, a conclusion follows that there are legal prerequisites for online communities to draft and present petitions using social technologies.

Regarding consultation, it is notable that legislation contains insufficient information on the consultation procedure. For instance, Article 7 of the Law on Legislative Framework of the Republic of Lithuania, regulating consultation with the public, specifies that *"there should be consultation with the public on time and on essential questions (consultation efficiency) as well as to such extent as it is necessary (consultation proportionality)"*. It also stipulates that *"methods and procession of results of consultation with the public are chosen by the subjects initiating consultation with the public. Information on the results of consultation with the public should be presented to the subject adopting a legal act"*. This rather a laconic definition suggests a presumption that no imperative requirements for consultation have been set within the legislative framework. While analysing the activities of the Seimas of the Republic of Lithuania in the field of consultation with the public, it should be noted that in its website, www.lrs.lt, there is a tab "Information for the Public" which publishes several announcements about proposals

and remarks from the public, without detailing the ways these proposals could be presented but giving the email address in the contacts. Thus, it is presumed that proposals could also be presented electronically. However, it is obvious that the Seimas does not use other social technologies, e.g., Facebook or other social networks, for civic engagement in the decision-making process, though the Seimas of the Republic of Lithuania has a Facebook account which is constantly maintained.

While drafting laws electronically, Article 17 Section 3 of the Law on Legislative Framework stipulates that representatives of the public or their groups can participate in such a process when presenting proposals for a draft law.

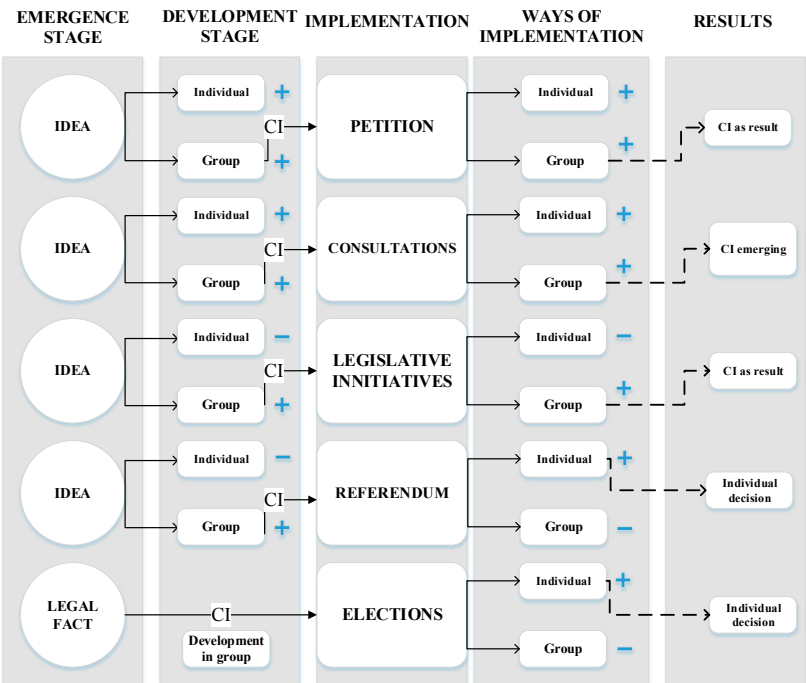
Legal prerequisites concerning the use of social technologies in civic engagement in the decision-making process could be found in other legal acts. However, they frequently do not have the form of a provision of a legal act but are derived from a specific law of a dispositive nature. For instance, the Law on Public Administration specifies that *"the methods of consultation (meetings of the interested persons, polls, publicly announced meetings, initiation of representatives, and other ways of finding out the opinions) shall be chosen by an entity of public administration at its own discretion, unless the law provides otherwise",* thus leaving a wide discretion of decisions for a legislative institution or an official.

Primary and secondary legislation on territorial planning does not specify in detail the ways of implementing consultation. It should be noted that social technologies are already widely applied while informing the public as in accordance with the provisions it is imperative to announce territorial planning documents and their drafts in the Internet websites of the planning organizer. Despite public announcement of territorial planning documents in the Internet, a considerable part of public procedures of the systematic evaluation of the provisions is still based on direct participation. For instance, in case of public meetings, pursuant to the provisions of Clauses 27-31 of the Law on Informing the Public on Territorial Planning, a direct encounter of state institutions and interested persons is to be organized in a certain place at a certain time. The minutes of such a meeting are to be written down. In case of public exposure, a meeting could be held at a certain time in the premises of a parish or local government as well as directly. While evaluating presentation of proposals as one of the constituent parts of the consultation procedure, it should be noted that they could be presented

electronically. This conclusion follows from the fact that legislators oblige organizers of planning to provide their email address in the contact data. While systematically evaluating legal regulation of consultation, it is notable that it is not banned to use social technologies in the consultation form of civic engagement in the decision-making process. There are no identified obstacles for networked communities.

Conclusions. Having chosen a genome model of Collective Intelligence created by the USA researchers and gradually searching for answers to every questions posed by them, the authors of the present chapter crystallized those forms of civic engagement in the decision-making process, stipulated in valid legal acts, which having a potential to generate Collective Intelligence and involve the use of two-way communication. The following scheme presents the conclusions drawn in this monograph.

Table 22. Forms of civic engagement in the decision-making process and their potential to generate Collective Intelligence



Source: developed by the authors

Having systematically analysed the forms of civic engagement in the decision-making process entrenched in legal acts of the Republic of Lithuania, a conclusion can be drawn that in Lithuania five main forms are used: elections, petitions, referendum (including local population surveys), legislative initiative and consultation, the latter being understood in the broad meaning of the word as a form of civic engagement in the decision-making process which in different ways initiates and carries out a dialogue between the public and state or local government officials who make decisions. These forms are presented in the middle of the scheme. However, during the research it was established that out of five forms only three of them were non-personal forms of participation which application means that exceptionally individual intelligence of the person is used.

The analysis of the aforementioned forms of civic engagement in the decision-making process led to the search for answers to the questions posed in the model of Collective Intelligence genome. While seeking to answer the question *Who is doing this?* and having analyzed the subjects whose participation is encouraged by different forms of civic engagement in the decision-making process, it was established that elections and referendum presuppose possibilities for individual expression of one's opinion, while in case of the right of legislative initiative, such possibilities are provided only for groups of individuals. Other forms could be used either by separate individuals or by their groups. Thus, the analysis of different forms of civic engagement in the decision-making process revealed that Collective Intelligence is generated only in case of petitions, consultation and legislative initiative. However, it is obvious that the objectives of petitions and legislative initiative are the production of Collective Intelligence, i.e., a certain document is submitted for consideration. It is not, in fact, subject to further improvement or correction by a group of its authors. In case of consultation, the situation is different as its result is further analysis of proposals and their improvement using Collective Intelligence. Consultation should be an ongoing process which would continue until a certain document is aligned and its final version is presented to competitive institutions for consideration.

While searching an answer to the question *What is being done?,* it was ascertained that in case of all the forms of engagement in the decision-making process, the public has a possibility to create certain variants of desired decisions. Even though some forms (e.g., a draft law or a petition)

can be designed either by an individual or a group, in both cases legal acts insure space for producing Collective Intelligence. Meanwhile, the consultation procedure (as it is understood within the framework of this research) has a potential not only to make new decisions, but also to improve the ones which were earlier presented in order to better correspond to public interests. Owing to the continuous nature of the consultation procedure, Collective Intelligence can be most efficiently applied. By its nature, this form of civic engagement in the decision-making process has considerably broad contents, including various ways of initiating dialogues between state institutions and the public. Therefore, it should be noted that it is here that the synergy effect, created by Collective Intelligence, presents its possibilities for use. It is guaranteed by a two-way nature of communication as in case of previously analyzed forms the communication is one-way: the public presents a document as the result of intellectual activity, while the other side, state institutions, either scrutinizes it or rejects it. Thus, in case of consultation, we talk about the process which creates prerequisites for Collective Intelligence, while a draft law or a petition may not reflect the result of Collective Intelligence as they do not reveal the process of drafting the document presented for consideration. It may also be an individual idea approved by a group of persons who have not contributed any efforts to its creation and development.

In search of the answer to the question *How is this being done?,* it has been established that there are no prerequisites for the implementation of Legislative Initiative (including the right to initiate a referendum) using social technologies. Petitions could be presented either in the usual way or using social technologies; however, while evaluating present legal regulation in the sphere of consultation, it is manifest that it is not prohibited to use social technologies for civic engagement in the decision-making process. Online communities do not seem to have any obstacles either.

Moreover, it should be noted that the emergence of the need for the application of any of the aforementioned forms is to be related to the promotion of a certain idea which could be the result of either individual or Collective Intelligence activities. Apparently, an exception from this rule could only be elections as the Constitution clearly stipulates their intervals and significance. In other cases, Collective Intelligence is successfully applicable as this process (generation of an idea) seems to have no obstacles in the virtual environment.

4.1.3. The Potential of Online Community Projects to Foster Innovations in Lithuania

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In order to assess the potential of online community projects to foster innovations, the authors conducted a qualitative analysis of such projects. Research sample was setup according to the following criteria:

- Lithuanian origin of communities;
- Communities have specific goals;
- Communities have capabilities to involve masses (large number) of members;
- The sample must include both member-initiated and organization-sponsored projects;
- The sample must include communities of various orientations (e.g., social, professional, commercial, non-profit and governmental).

These criteria led to the selection of 11 online community projects and deeper qualitative content analysis. Based on Porter's interdisciplinary classification system discussed in Chapter 3.2, "Collective Intelligence systems – online and virtual communities", the sample consisted of the following groups of communities: 3 member-initiated social communities (*I for Lithuania*[78] and *Lithuania 2.0*[79]*, We act*[80]); 4 member-initiated professional communities (*Construction21.eu Lithuania*[81]*, Virtual educators community*[82]*, Future cities*[83]*, Smart & green city*[84]); 1 organization-sponsored commercial community (*Business forum*[85]); 1 organization-sponsored non-

[78] <http://www.aslietuvai.org/lt/i-top/ivadas>.
[79] <https://www.lietuva2.lt/lt>.
[80] <http://www.mesdarom.lt/kas-yra-darom/>.
[81] <http://www.construction21.eu/lietuva/>.
[82] <http://ejournal.emokykla.lt/virtuali_bendruomene/index.php?output=FrontPage()>.
[83] <http://www.ateitiesmiestai.lt/apie-mus/>.
[84] <http://www.smartandgreencity.com/>.
[85] <http://www.verslobrolis.lt/index.php>.

profit organization (*Transparency line*[86]); and 2 organization-sponsored national and local governmental online community projects (*Global Lithuanian leaders*[87] and *City problems*[88]). Data were analyzed and organized using three groups of components: areas of CI employment: project management and knowledge management; market research and customer service; e-participation. These elements express functions performed by CI in creation and design of innovations. The more components certain online community project encompass – the greater the potential it has in fostering innovations. Table 23 provides an overview of the selected projects and elements of their activity.

Results of the analysis show that online community projects are most active in the areas of project management and knowledge management. Appearance of e-participation components is lower. Market research and customer service components were available only in few instances. Hence, the most favorable conditions for the emergence of CI and innovation appear when online communities are employed for creation and/or implementation of social or commercial projects. It must be noted from a deeper analysis of separate areas regarding CI components, only few of the online community projects had technological conditions for the emergence of CI and innovations.

Knowledge collection and transfer is the most implemented component and can be observed in all the selected online projects. Nevertheless, the sole existence of this element (without interaction with other elements) is not sufficient for the emergence of CI and innovative solutions. The element of collective creation of new knowledge, which is more important in terms of innovation creation, can be noticed only in 3 out of 11 online community projects. *Search for consensual knowledge* (i.e., when community members are seeking for a common decision when solving problems, generating ideas or alternatives) can be spotted only in 2 platforms. Only 1 out of 11 communities integrate the component of *collective solving of scientific problems* into their activities. Most of the platforms express the element of *participant's engagement* well. However, some platforms emphasize attraction of experts rather than mass participation and engagement.

[86] <http://skaidrumolinija.lt/apie/>.
[87] <http://www.lithuanianleaders.org/about-gll/>.
[88] <http://old.vilnius.lt/newvilniusweb/index.php/159/?>.

Platforms, which include business actors, aspire to ensure exchange of information and expert knowledge. Nevertheless, some business-oriented online communities allow generation of ideas and problem solving activities.

Socially-oriented online communities when achieving their designed goals also perform an important public function, i.e., promote citizen involvement into public affairs. Hence, the elements of e-participation are closely related to the elements of project management and knowledge management. It must be noted that Lithuania has a serious problem with citizens" social activity – low political self-awareness and civic engagement. Therefore, the most active members of Lithuanian society try to fix this situation using various means of social technologies. CI components of e-participation play a very important role. Interactive engagement in public problem-solving draws such advantages for participative policy-making (Driessen et al., 2001; Pragere et al., 2008; Edelenbos and Klijn, 2005): serves to bring information about the needs and values of the public that add to existing knowledge; provides information about the present situation from different angles and outlines an actual and desirable state; helps to create new knowledge about possible alternatives and plausible solutions; contributes as consensual knowledge when adjusting different attitudes of policy actors; secures policy implementation via possessing new knowledge as its own pragmatic justification; serves to acquire knowledge stimulating policy actors" learning process for future actions and interest representation.

Table 23. Components of CI within Lithuanian online community projects

Area for CI employment	Component of CI	Online communities with emerging CI	Number (percent)
Project management and knowledge management	Participants" engagement	Lithuania 2.0; I for Lithuania; Smart & green city; Transparency line; Virtual educators community; We act	6 (55)
	Targeting and motivating the right participants	**Smart & green city;** Global Lithuanian leaders; Construction21. eu Lithuania; Virtual educators community; Future cities	**5 (45)**
	Solving scientific problems	Construction21.eu Lithuania	**1 (9)**

	Collective and collaborative communication	Lithuania 2.0; **I for Lithuania;** Business forum; Construction21.eu Lithuania; Transparency line; Virtual educators community; Future cities; **Global Lithuanian leaders**	8 (73)
	Knowledge collection and transfer	Lithuania 2.0; **I for Lithuania;** Business forum; Global Lithuanian leaders; Construction21.eu Lithuania; Transparency line; Virtual educators community; **City problems; Smart & green city; Global Lithuanian leaders; We act**	11 (100)
	Collective creation of new knowledge	Lithuania 2.0; **I for Lithuania;** Construction21.eu Lithuania	3 (27)
	Collective idea development	Lithuania 2.0; **I for Lithuania;** Construction21.eu Lithuania	3 (27)
	Search for consensual knowledge	Lithuania 2.0; **I for Lithuania**	2 (18)
Market research and customer service	Reaching of wide population	Business forum; Future cities	2 (18)
	idea creation	Construction21.eu Lithuania; Future cities	2 (18)
	Knowledge collection	Business forum; Construction21.eu Lithuania	2 (18)
	Expertise sharing	Business forum; Global Lithuanian leaders; Construction21.eu Lithuania; Future cities	4 (36)
	Reaction to unsolved problems	Business forum; Construction21. eu Lithuania; Future cities; **Global Lithuanian leaders**	4 (36)
E-participation	Public engagement	Lithuania 2.0; **I for Lithuania; Smart & green city;** Transparency line; City problems; Future cities; We act	7 (64)
	Problem identification	Lithuania 2.0; **I for Lithuania;** Transparency line; City problems	4 (36)
	Idea creation and development	Lithuania 2.0; **I for Lithuania;** Future cities	3 (27)
	Knowledge collection and transfer	Lithuania 2.0; **I for Lithuania;** Transparency line	3 (27)
	Interest representation	Lithuania 2.0; **I for Lithuania; Smart & green city;** Transparency line; City problems; Future cities	6 (55)

Source: developed by the authors

The analysis revealed that most of the CI components are encompassed in online community projects *Lithuania 2.0* and *I for Lithuania*. Although the goal of these platforms is to address social problems and concerns, they have the largest potential to foster innovations. *I for Lithuania* community declare their mission to foster wisdom of crowds in order to solve Lithuania social issues. This online community seeks to influence state politics while collecting, analyzing and implementing new ideas. Both mentioned platforms apply solutions of social technologies that lead to Collective Intelligence. *Lithuania 2.0* and *I for Lithuania* created conditions suitable for generation of ideas for value creation using insights and experience of various users. These two projects connect socially motivated and geographically dispersed participants who can compete by submitting ideas and focus on finding alternative solutions for social problems. The platforms break down the problems and innovatively distribute tasks. Using non-hierarchical principle, participants use small informal groups to work on specific problems. Group members have several roles – project management and task leaders. Active participation leads to receiving more rights and responsibilities. For CI and innovations to occur, it is important that platforms allow collecting and storing knowledge, insights and expert evaluations of the groups that are vital for future decisions. As can be seen in Table 23, only half of the selected platforms have abilities to collect suggested ideas, evaluate and implement them. *I for Lithuania* divide ideas into several value levels: global, national, organizational/ community, individual. *Lithuania 2.0* has a different approach – collected, discussed and implemented ideas are used to influence political decisions. An important condition for CI and innovation creation is the availability of various actors in the debates. Both online community projects allow participant discussion, interaction, voting and commentary. The effectiveness of these activities in terms of CI and innovation emergence depends on the number of active participants. However, a great number of participants may introduce operational and managerial challenges – each participant wants to address different problems, so it becomes difficult to handle information flows. Complexity of online community projects burden information search, ability to process large amounts of data, identify supreme problems needed to be solved. Because of that, such projects need to find a way to avoid unnecessary or duplicated information, structure the debate and reach consensus in large groups.

Another analyzed member-initiated online project with social orientation is *We Act*. However, compared to the previously discussed platforms, possibilities for CI and innovation emergence here are rather limited as they encompass only several components of CI. The platforms strive to engage wider public in societal problem-solving, collection and transfer of knowledge on ongoing and forthcoming social actions.

Construction21.eu Lithuania, *Virtual educators" community*, *Future Cities*, *Smart & green city* have professional orientation. They are designed for professionals to share information and find problem solutions while participating in discussions with colleagues from other organizations. In spite of that, they do not ignore wider public and seek to attract as many participants as possible. The most accurate example of online community with professional orientation is *Virtual educators" community*. *Smart & green city*, *Future cities* and *Construction21.eu* focus on gathering public organizations, government authorities, business sector representatives in one place and stimulate thinking, discussions and calculations on optimal use of natural and energy resources. These platforms are distinct from others because instead on focusing on social problem only, they take into account market conditions and business interest. Participants of *Construction21.eu Lithuania* and *Future cities* platforms can contribute to ideation process. Meanwhile, *Smart & green city* still exists as a website not only informing community members about its activity, but it also provides limited opportunities to discuss and express views. This platform compared to other professional platforms has fewer CI components and has a limited amount of conditions for CI and innovation to emerge.

Business forum aims to create a community of entrepreneurial young people in order to represent their interests and to help build commercially successful new business. This forum includes several CI components. It strives to reach wide population, collect knowledge and share expert opinions, has search tools for problem-solving, but does not include technological solutions for idea creation and development.

Transparency line addresses its goal of fighting corruption by means of participants" attraction, accumulation and transfer of corruption and bureaucracy related knowledge, exchange of experience and consultation. In addition, the platform contributes to the development of e-participation, as participants collectively search for ways how public interest could be represented and/or defended. Such feature of Collective

Intelligence plays a very important role in societies with a low level of civic engagement.

Global Lithuania Leaders – a community initiated and curated by Ministry of Economy of the Republic of Lithuania – allows the emergence of CI and innovation by targeting and motivating the right participants, collecting and transferring knowledge on possibilities of Lithuanian products in global markets. This platform contributes to entrepreneurship education of society. Using the platforms, community members can share experiences, create social networks, and announce and solve business problems in an online forum via CI component of collective and collaborative communication.

Vilnius city municipality website offers service named *City problems*. So far, it only encompasses CI elements of public engagement and problem identification because it allows residents of Vilnius to register observed problems. Although, the site lacks additional functionality (comments, suggestions, monitoring) to be considered an online community platform, but this type of project can be considered as the first step towards a functional platform for dealing with Vilnius problems.

Speaking of Lithuania's online communities" potential to introduce innovations, it is worth mentioning that the majority of Lithuania's online communities have already attained certain social maturity and tend to focus on social and business problems and search for innovations. Comparison of Lithuania's business and civic communities reveals a more intense activeness of social initiatives and an increase in the number of community projects; however, in this stage of the research, only assumptions and future projections of certain innovative solutions have been identified instead of actual social or business innovations.

4.2. The Extent and Major Trends in Developing Collective Intelligence through Online Communities

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At the stage of quantitative research, the extent and major trends of the engagement and participation of the society members and other stakeholder groups in building Collective Intelligence were explored. The selection of

the respondents was undertaken by respecting general rules of a random stratification sample and the specifics related to the participation in the process of building Collective Intelligence. The respondents were selected according to the following criteria: the initiators of projects of indirect communication, potential and/or current participants of the process of Collective Intelligence formation (both passive and active) and others. In order to achieve statistical sample and the credibility of data collection procedures, services of a public opinion and market research company have been used to deliver surveys of at least 1000 sample of respondents.

Objectives and goals. To ascertain the scope and the content of Lithuania's public involvement into activities of online socially-oriented communities, a representative interviewing of Lithuanian citizens has been carried out.

An original research instrument (a questionnaire) has been developed comparing the following main parts:

- to measure the level of Lithuanian citizens" interest in social technologies and social networks;
- to learn the content of participation in activities of online communities;
- to measure the level of content with participation in virtual environments of indirect communication;
- to measure the level of satisfaction of the participation of environments of virtual indirect communication.

As the purpose of the social survey is cognitive and focuses on recognition of the social environment where the potential of Collective Intelligence concentrates on aspirations to learn the character of potential shapers of the Collective Intelligence, the idea to form any hypotheses have been abandoned and the analysis of the research data has been limited to a mere descriptive analysis.

Selection of respondents. The target group comprises of 15 to 74 year old citizens of Lithuania. To ensure research representativity, the interviewing was carried out by a market research company JSC Social Data Center between October 2013 and February 2014.

Households and respondents for the research were selected through a multistage random sampling. The interviewed sample respondents represent all social demographic layers of Lithuania's population. The households for the respondent selection were chosen in the following stages:

- 1) Geographically selective distribution; the selection geographically corresponds to general proportions of the population in various Lithuania's regions; 2) reference to the latest data by Lithuania's Statistics Department;
- Initial selection points, i.e., addresses, where selection routes start, were selected at random from the database of the population register of the Statistics Department of Lithuania. The total number of such points was 117.
- The actual households were selected by application of the route selective technique where each second household in the city, town or village is visited starting with the initial selection point. The actual respondents were selected in accordance with the *youngest man* rule.
- Geographically, the selection was distributed so as to proportionally correspond to data by Lithuania's Statistics Department. The geographical selection of the respondents was based upon 3 criteria:
- the selection was geographically divided into 15 groups (5 cities and 10 regional districts). Each group is sized in accordance with the data of the Statistics Department;
- the selection is formed paying attention to proportions; and
- sizes of the cities, towns or villages.

Data of the geographic distribution of the selection among cities, municipalities and districts and in accordance with the sizes of the selected areas are presented in Annex 2.

Interviewing of the selected respondents was carried out in December 2013. The interviewers visited 4998 households, 1326 of which had no potential respondents. 667 households and 564 selected respondents refused to take part in the survey. 918 potential respondents failed to meet criteria of the survey. 493 interviews did not start due to objective reasons and 8 interviews were terminated by the respondents. Thus, the survey involved 1028 interviewed respondents. 6 questionnaires were rejected immediately after interviewing.

Socio-demographic characteristics of the respondents are presented in Figure 11 below:

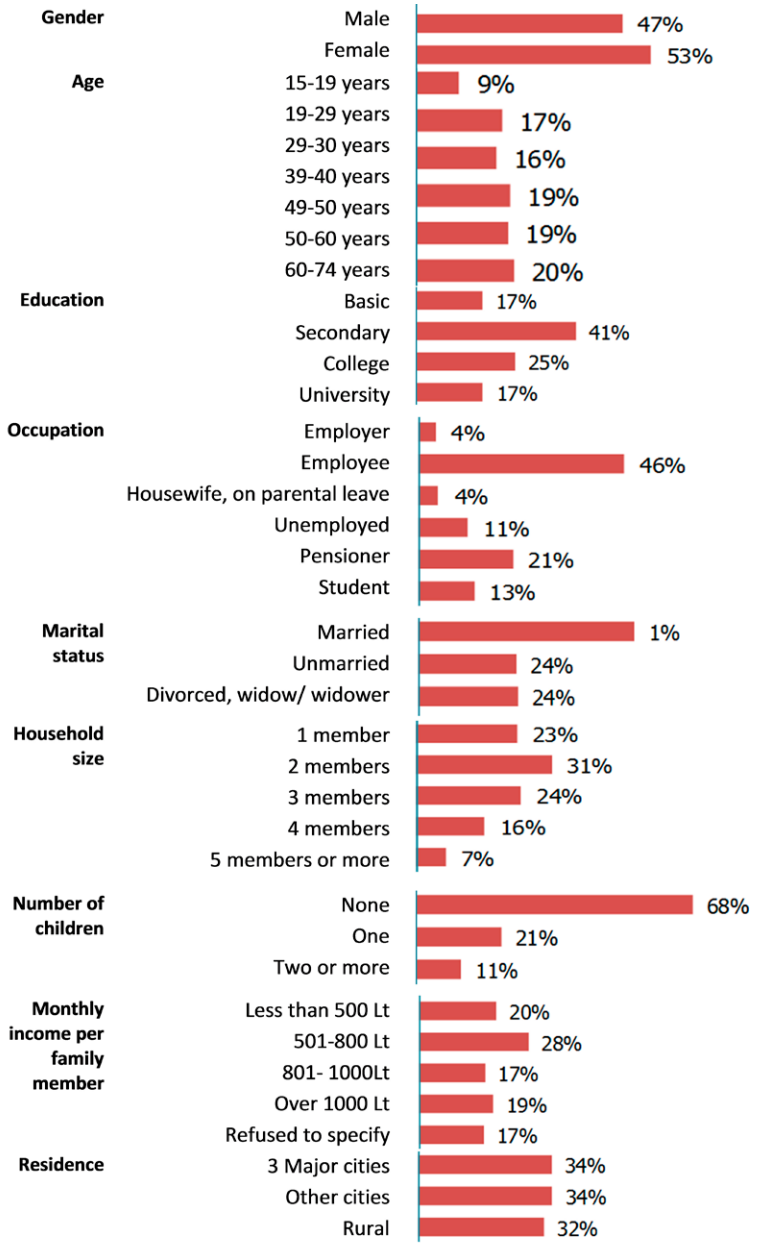


Figure 11. Socio-demographic characters of the respondents

Interviewing techniques. The survey is based on computer processed (CAPI) responses collected during direct interviewing carried out in the place of respondent's residence (Omnibus interviewing). The questionnaire used in the computer aided interviewing was designed in advance. The software allows direct control of quotas, logical and input errors, logical correlations between used questions, sequence of questions and corresponding responses. Interviewers have no possibilities to change the programmed sequence of questions. The collected data are automatically stored in the computer memory to avoid input errors caused by the human factor.

Interview quality control. Reliability of interview results mostly depends on how interviewers actually conduct interviews and follow data collection quality standards. To ensure accuracy and reliability of the collected data and to avoid input and processing of false data or data collected in noncompliance with the requirements of the survey, *JSC Social Data Center*, the company hired to conduct interviewing, appointed special employees to conduct quality control. The used standardized quality control system is quite complex and time-consuming, but necessary to grant accuracy, reliability and quality of the stored data. The system operates so as to ensure maximum speed and reliability of the quality control. The data quality control included the following factors: compliance with the household and respondent selection rules, the quality of completed questionnaires, the quality of completed route and respondent records, compliance with the general principles of interviewing and the conduct of the interviewer. To check the quality of the collected data, the following standard revise methods were used: (1) manual check of the data lines, (2) telephone inquiries, (3) inspection of compliance with methodological standards of the survey, (4) inspection of interviewing. The manual check means that all collected questionnaires were manually checked by company employees. During the manual check, the following quality parameters were used: compliance with the respondent selection rules; completion of the respondent socio-demographic profiles, if the questionnaires were completed by the selected respondents only; completeness and accuracy of the data on interviewing in the questionnaire (interviewer's name, interviewing date, place, language, etc.); completeness of the questionnaire (all questions are answered); if several answers are not marked in multiple choice questions; if the responses are comprehensive and clear (spontaneous); presence of respondent contacts necessary to check accuracy and reliability of the data. To check the interviewing quality via

telephone inquiries, at least 10% of the survey respondents were called. The actual respondents to inquire were selected in accordance with the survey selection requirements. During the phone inquiries, the respondents were asked to specify the following: if the socio-demographic data specified in the questionnaire were correct; if the socio-demographic data of other family members were correct (where the respondent selection was based on the nearest birthday rule); if the interview was conducted by the same interviewer; if the interviewers introduced themselves and presented their interviewing authorization; if the interviewers applied a proper interviewing technique; etc. The survey's compliance with its methodological requirements was checked by revising completion of interviewers" route bills. The following data were checked: interviewing date and time; relevance of the used selection increment; possible recurrence of interviewer visits; completeness and accuracy of data on visit results (refusal to take part in the survey, successful interview, absence of relevant respondents, etc.); adherence to the rules set for household selection; completeness of the route bill. Where the quality or reliability of the collected data are doubted and where a phone inquiry is not viable, experts of the Quality Control Department arrive to the place of interviewing and check if the respondent has actually been interviewed in accordance with the rules set for the survey.

On completion of the quality control procedures, experts (1) prepared a report on final results of the telephonic control (technical report on the survey and interviewers), (2) submitted data on errors made by interviewers and invalidated questionnaires to the survey coordination department that subsequently passed the data to regional coordinators and interviewers, (3) submitted the revised data, excluding the invalidated questionnaires for final processing.

Data analysis procedures and statistical error. To equalize data obtained during the representative survey, the data was scaled according to the gender, age and residence place of the respondent. The obtained data were processed by means of SPSS/PC.

Analysis of the data presented general dispersion of the submitted answers and dispersions within predetermined population groups. To assess interdependence of the used criteria, χ 2 test was used. A relation is statistically significant when $\chi 2$ statistics (p value) is less than or equal to 0,05 ($p<=0,05$); then, the probability that responses to a certain question significantly depend on responses to another question is 95%.

The statistical error has also to be taken into account as the survey involves only selected respondents. The error is calculated mathematically. Errors for various numbers of respondents and dispersions of responses are given in the table below. The maximal statistical error observed in assessment of all responses (1000 respondents) is caused by the conducted selection and equals to ±3% with a 95% reliability level, i.e., is less than ±5% at a 95% reliability level.

Where a smaller target group is being analyzed, the result should be interpreted taking into account a more significant maximal selection error that does not exceed ±10% when the target group is represented by 100 respondents. Assessment of result reliability limits is given in the table below:

SAMPLE SIZE	Dispersion of responses									
	50	45/55	40/60	35/65	30/70	25/75	20/80	15/85	10/90	5/95
10	31	30.8	30.4	29.6	28.4	26.8	24.8	22.1	18.6	13.5
30	17.9	17.8	17.5	17.1	16.4	15.5	14.3	12.8	10.7	7.8
50	13.9	13.8	13.6	13.2	12.7	12.0	11.1	9.9	8.3	6.0
75	11.3	11.3	11.1	10.8	10.4	9.8	9.1	8.1	6.8	4.9
100	9.8	9.8	9.6	9.3	9.0	8.5	7.8	7.0	5.9	4.3
150	8.0	8.0	7.8	7.6	7.3	6.9	6.4	5.7	4.8	3.5
200	6.9	6.9	6.8	6.6	6.4	6.0	5.5	4.9	4.2	3.0
300	5.7	5.6	5.5	5.4	5.2	4.9	4.5	4.0	3.4	2.5
400	4.9	4.9	4.8	4.7	4.5	4.2	3.9	3.5	2.9	2.1
500	4.4	4.4	4.3	4.2	4	3.8	3.5	3.1	2.6	1.9
600	4	4	3.9	3.8	3.7	3.5	3.2	2.9	2.4	1.7
700	3.7	3.7	3.6	3.5	3.4	3.2	3	2.6	2.2	1.6
800	3.5	3.4	3.4	3.3	3.2	3	2.8	2.5	2.1	1.5
900	3.3	3.2	3.2	3.1	3	2.8	2.6	2.3	2	1.4
1000	3.1	3.1	3	3	2.8	2.7	2.5	2.2	1.9	1.4

Survey questionnaire. The survey employed an original research instrument (questionnaire) made of questions that would allow insights into the level of Lithuanian society's interest in social technologies, the extent of awareness of and motivation to take part in online community projects, the content of involvement of active community members into the process of Collective Intelligence formation and the level of satisfaction with participation in virtual environments of indirect communication. The questionnaire comprises 5 blocks of questions, ranging from general questions about the Internet usage trends to specific ones about respondents" approach towards measures safeguarding security of virtual communication. The question types vary from closed-ended to open-ended and include nominal, ordinal, interval and Likert scale questions. The major question blocks are presented below and the explicit questionnaire including optional answers (where relevant) and interlinks between the questions is given in

Annex 1.

Questionnaire:

I. Internet user level and purposes

1. How often do you personally use the Internet?

2. What do you usually do on the Internet?

II. Extent of involvement into virtual communication networks; goals, participation character and activeness

3. How often do you use or visit websites of online communities or social networks?

4. What are the types of websites of online communities or social networks you use?

5. What are the types of websites of online communities or social networks the active member of which you are (i.e., you regularly write, comment and share ideas)?

6. What purposes do you use online communities or social networks for? Specify 3 most important in descending order.

7. What reasons do you refuse to use online communities or social networks for?

8. Specify 3 national (Lithuanian) news portals that are best-known to you.

9. Specify 3 most famous regional or local news portals.

10. Specify 3 online projects that you know.

11. Specify 3 online communities, social networks or online conferences that are best-known to you.

12. Specify 3 online communities or social networks you spend most time in.

III. Awareness of online civil initiatives and involvement into civil networks

13. Which of the following civil initiatives do you know?

14. Do you use any websites where social problems are discussed (e.g., proposals on how to deal with alcohol abuse, open letters to initiate amendments in legislation, referendums, etc.)? If yes, which websites do you use?

15. What do you normally do on the websites where social problems are discussed?

16. What topics or activities dealt with on websites or in online communities or initiatives where social problems are discussed are most relevant to you?

IV. Assessment of missing online projects, reasons for abstention, satisfaction with virtual social projects, quality assessment of virtual communication

17. What websites, online communities or initiatives do you miss in terms of their content and activities?

18. Why do you refuse to use websites or take part in online communities or initiatives where social problems are discussed?

19. To what extent are you comfortable with online communication to discuss social and political issues?

20. What do you miss mostly in online communication to discuss social and political issues?

21. How do you rate various aspects of virtual communication?

V. Assessment of security level granted in virtual communication

22. You will now be read various statements about security and regulation of online activities. Rate each of the statements.

4.2.1. Quantitative research results

4.2.1.1. Internet using level and purposes

How often do you personally use the Internet? *Percentage is calculated from the total number of respondents (N=1022).* Nearly half of the respondents use the Internet every day. 63 percent of the respondents use the Internet at least once a week. Nearly one third of 15-74 year old respondents never uses the Internet or uses it less than once every three months.

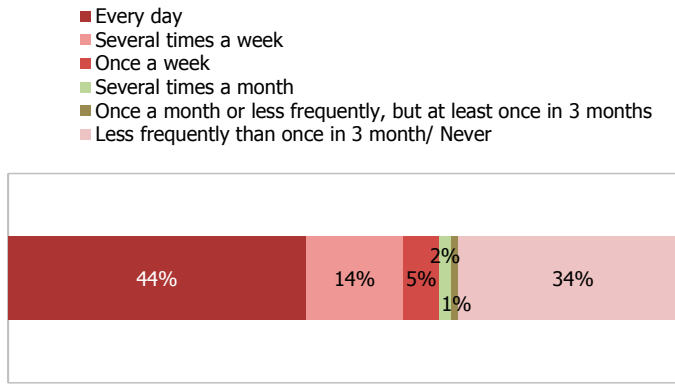


Figure 12. Internet user level

Statistically, more frequent everyday uses of the Internet include people under 39, people with university education, students, pupils, unmarried people, 3 or 4 member families, respondents whose monthly income is over 1000 Lt per family member, respondents who refused to specify their income, residents of the country's 3 biggest cities. Respondents who use the Internet several times a week include 30-39 and 40-49 year old individuals with non-university education, skilled employees and married people whose families count over 5 family members.

Respondents who use the Internet once a week include 40-49 and 50-59 year old individuals with secondary education, skilled employees and married people. Respondents who never use the Internet or use it less than once in three months include 50-59 and 60-74 year old individuals with primary or basic education, unemployed people, pensioners, divorced people, widows/widowers, 1-2 member households with no children, people whose monthly income is under 800 Lt and rural residents.

What do you usually do on the Internet? Percentage is calculated from the number of respondents who use the Internet (N=675). The Internet is typically used for professional and personal communication, to search for information and learn the news, to perform personal financial operations, for gaming and learning (indicated by 56–67 percent of the respondents). The least frequently indicated purpose the Internet is used for is to share ideas and opinions and maintain personal objective communication.

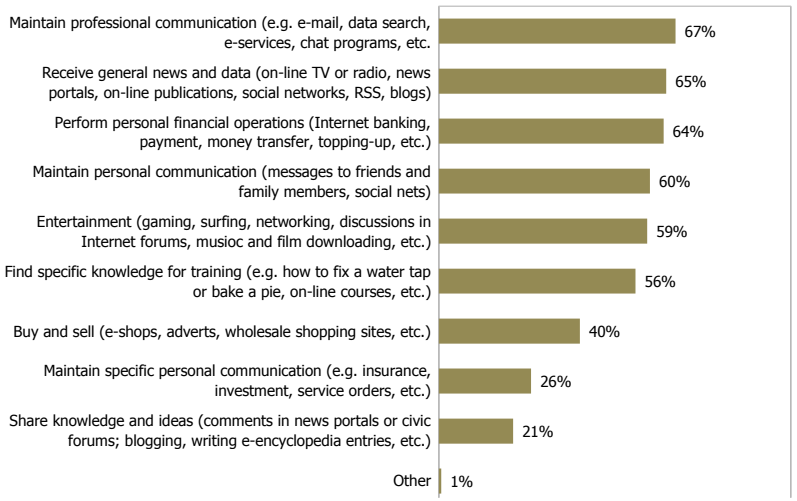


Figure 13. Purposes the Internet is used for

Statistically, almost all listed purposes the Internet is used for apply to 20-29 year old people with university education, students, pupils, unmarried people and residents of the country's 3 biggest cities.

4.2.1.2. Extent of involvement into virtual communication networks; goals, participation character and activeness

How often do you use or visit websites of online communities or social networks? *Percentage is calculated from the number of respondents who use the Internet (N=675).* Websites of virtual communities and social networks are used by over a half (61 percent) of Internet users, one-third (35 percent) of which visit the websites every day and one fifth (21 percent) use them at least once a week.

More than one third of the Internet users are reluctant to use websites of online communities and social networks: the vast majority of them never visit such websites, whereas 6 percent are registered users, but never use them.

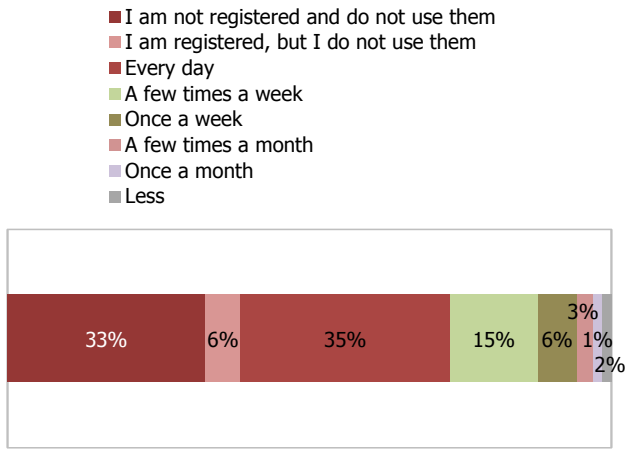


Figure 14. Extent of the involvement into virtual communication networks

Statistically, more frequent everyday uses of websites of online communities and social networks include 15-19 and 20-29 year old Internet users with primary or basic education, students, pupils, unmarried people living in 3 or 4 member families. Also, frequent users of such websites include visitors of websites where social problems are discussed.

Such websites are visited several times a week primarily by respondents who raise two or more children, while non-users typically include individuals over 40 with non-university education, skilled employees, pensioners, married and separated people, widows and widowers and single people, and people who visit such websites once a week or even less frequently are 30-39 year old individuals.

What are the types of websites of online communities or social networks you use? What are the types of websites of online communities or social networks the active member of which you are (i.e., you regularly write, comment and share ideas)? *Percentage is calculated from the number of respondents who use online social networks (N=443).* Use of and participation in online communities or activities of social networks (i.e., regularly write, comment and share ideas) phenomenally depends on participant's personal interests: the choice of groups and forums typically coincides with personal hobbies. The second most popular place is forums associated with training and studies.

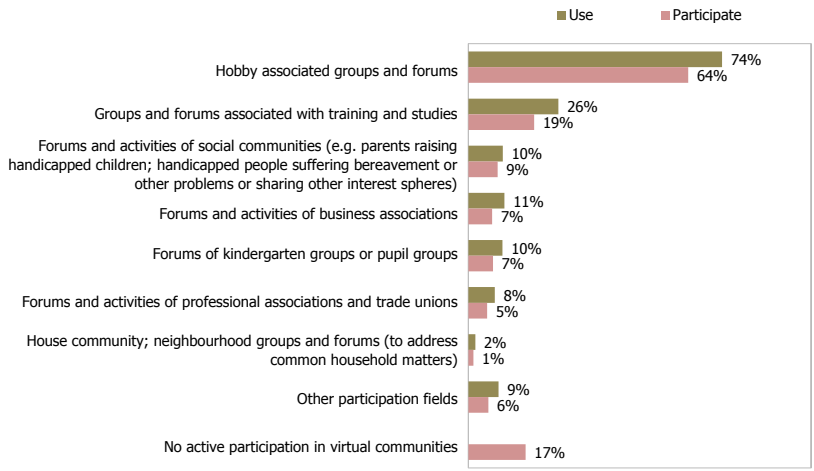


Figure 15. Use of and participation in online communities or activities of social networks

Hobby-associated websites are statistically more frequently visited by 40-49 year old visitors with secondary education and over 1000 Lt monthly income. Visitors of training-associated websites typically include 15-29

year old Internet users, students, pupils, unmarried people and everyday visitors of online community websites and social networks.

As for the active participation in such websites, women, people with university education, divorced people, widows and widowers are more frequent visitors in hobby-associated websites, whereas training-associated online communities and social networks are more frequently chosen by people raising two or more children.

What purposes do you use online communities or social networks for? *Percentage is calculated from the number of respondents who use virtual social networks (N=443).* Online communities and social networks are most frequently used to search for information and maintain communication with friends (44 and 64 percent, respectively). Also, such websites are used for entertainment (28 percent of the respondents) and inquiries about goods and services (26 percent of the respondents).

The least frequent purposes such websites are used for include lotteries, promotion of proposed initiatives and projects, voting for or donating to proposed initiatives and generating and submission of new ideas, initiatives or projects (1-3 percent of the respondents).

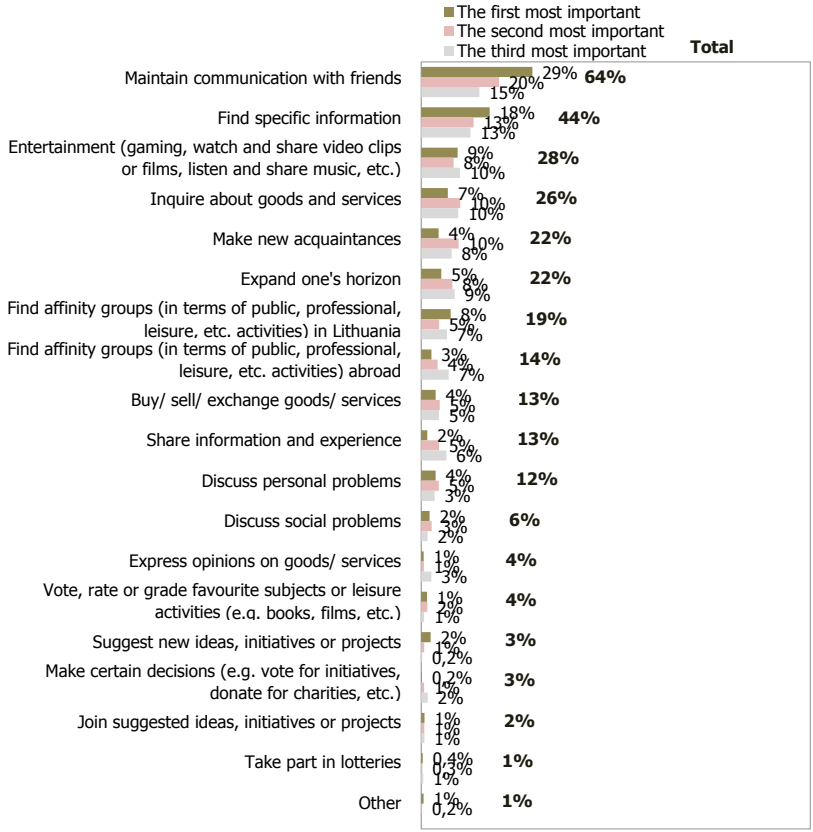


Figure 16. Reasons for participants to join virtual communication networks

Online communities and social networks are joined to maintain communication with friends primarily by unmarried people and respondents from 2 member households. The intention to find necessary information was more frequently indicated by men, people on parental leave, housewives, divorced individuals, widows, widowers and residents of the country's 3 biggest cities.

What reasons do you refuse to use online communities or social networks for? *Percentage is calculated from the number of respondents who use websites of online communities and social networks (N=222).* Unacceptability of the online communication, absence of interest and shortage of time are among the most frequently mentioned reasons to

refuse connection to online communities or social networks. Online communication as unacceptable was typically mentioned by people who raise a single child and by respondents residing in places other than Lithuania's major cities. Absence of interest in websites of online communities and social networks was more frequently indicated by 30-39 year old people and by residents of the country's 3 biggest cities, while shortage of time was mentioned by people raising two or more children.

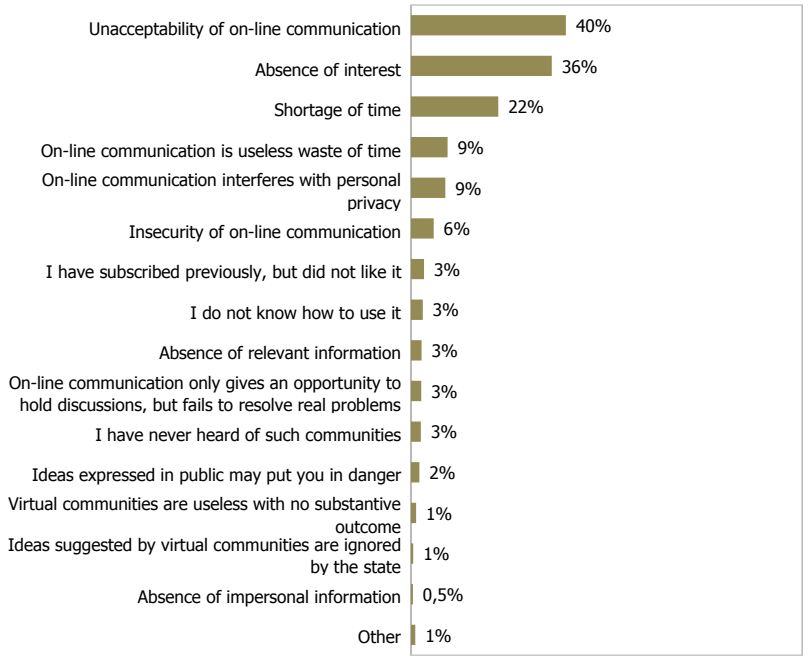


Figure 17. Reasons to refuse participation in online communities and social networks

Specify 3 national (Lithuanian) news portals that are best-known to you. *Percentage is calculated from the number of respondents who use the Internet (N=675).* The leading position in public awareness belongs to delfi.lt that is known by almost every Internet user. Half of the users also mentioned lrytas.lt and 15min.lt.

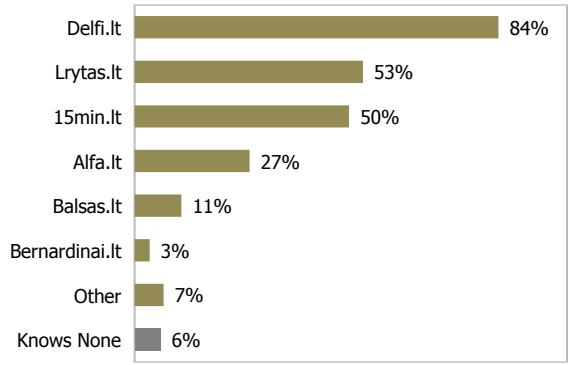


Figure 18. Best-known national news portals

Delfi.lt is statistically more popular among people whose monthly income per family member averages at 801–1000 Lt and those who use websites of online communities and social networks every day. The portal lrytas.lt is more popular among people with university education, while 15min.lt is visited primarily by 20-29 year old people, unmarried Internet users and people who use websites of online communities and social networks every day.

Specify 3 most famous regional or local news portals. *Percentage is calculated from the number of respondents who use the Internet (N=675).* Almost half of the Internet users that took part in the survey were unable to name a regional news portal, while awareness of the most frequently mentioned (Vilniausdiena.lt, Kaunodiena.lt, Skrastas.lt, Kaunozinios.lt) does not exceed 7 percent. Awareness of other portals is under 3 percent.

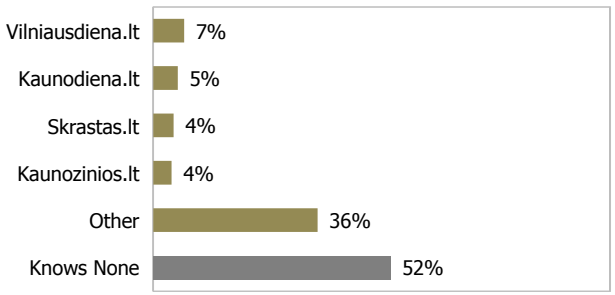


Figure 19. Best-known regional news portals

Zero awareness of news portals has been observed primarily among those who are reluctant to use websites of online communities and social networks or websites where social problems are discussed.

Specify 3 online projects that you know. *Percentage is calculated from the number of respondents who use the Internet (N=675).* The majority of Internet users were unable to mention any online implemented project; nevertheless, awareness of the project Darom.lt is surprisingly strong (19 percent) and exceeds awareness of any other regional news portal.

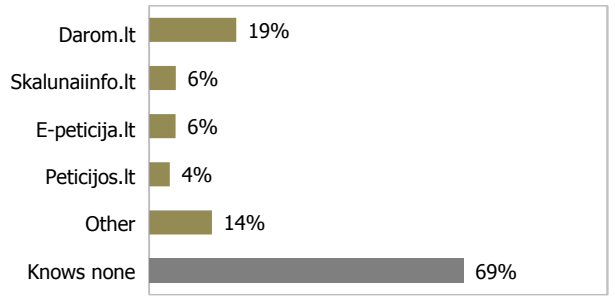


Figure 20. Online projects respondents are aware of

The project Darom.lt is statistically better known among unmarried people, people whose income is 801-1000 Lt, respondents residing in places other than Lithuania's major cities and those who use websites of online communities and social networks and websites where social problems are discussed every day. Zero awareness of news portals has been observed primarily among the unemployed, married people, couples raising two or more children, rural residents and those who are reluctant to use websites of online communities and social networks or websites where social problems are discussed.

Specify 3 online communities, social networks or online conferences that are best-known to you. *Percentage is calculated from the number of respondents who use the Internet (N=675).* The best-known social network is Facebook.com; the network is known by the majority of Internet users. One third of the Internet users mentioned One.lt.

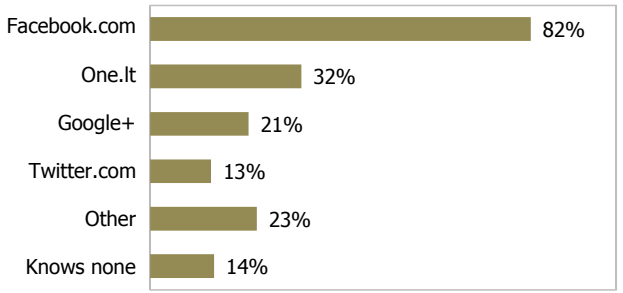


Figure 21. Best-known online communities, social networks and online conferences

Facebook.lt is statistically better known among 15-19 and 20-29 year old Internet users with primary or basic education, people on parental leave, housewives, students, pupils, unmarried people, respondents residing in places other than Lithuania's major cities and those who use websites of online communities and social networks and websites where social problems are discussed every day or several times a week.

No online communities or social networks are known to individuals over 40 with non-university education, skilled employees, pensioners, divorced people, widows and widowers, respondents from 2 member households and residents of the country's 3 biggest cities. Zero awareness of online communities or social networks was also exposed by those who are reluctant to register or use websites of online communities and social networks.

The best-known civil initiative is Darom.lt; the initiative is known by almost half (41 percent) of Internet users.

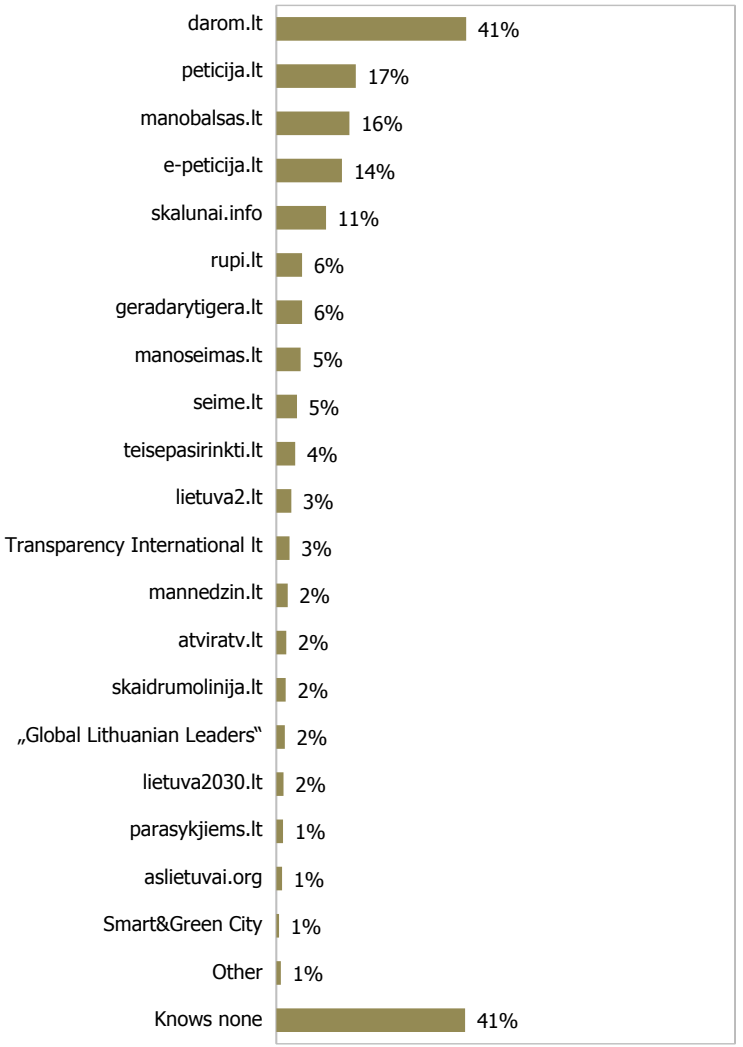


Figure 22. Best-known online civil initiatives

Darom.lt is statistically better known among 15-19 year old Internet users, students, pupils, respondents residing in places other than Lithuania's major cities and those who use websites of online communities and social networks and websites where social problems are discussed every day or once a week or even more rarely.

Specify 3 online communities or social networks you spend most time in. *Percentage is calculated from the number of respondents who use online social networks (N=454).* Facebook.com is also a social website, where protractions spend by visitors are longest.

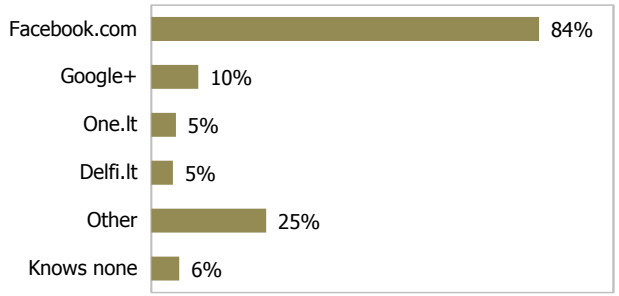


Figure 23. Websites of online communities or social networks where visitors spend most time in

Facebook.com is the website where the most protracted periods are spend in by 15-19 and 20-29 year old Internet users with primary or basic education, students, pupils, unmarried people and those who use websites of online communities and social networks every day or several times a week.

4.2.1.3. Knowledge about civil online initiatives and engagement in civil-oriented networks

Which of the following civil online initiatives do you know? Do you use the Internet pages oriented towards discussing and/or solving social problems (e.g., formulation of proposals on how to decrease the level of alcoholism in Lithuania, citizens" open letters to the state leaders on amendments of the existing law, initiating referenda, etc.)? Only 7 percent of all Internet users use the Internet pages oriented towards finding solutions to social problems. The rest 93 percent of the respondents do not participate in the networks in which important social problems are solved (*the percentage is calculated from the number of the respondents who use the Internet (N=675)).*

The Internet pages oriented towards solving social problems are used more often (the difference is statistically significant) by the respondents in whose household there is a child and by those who are everyday users of the Internet pages of online communities/social networks.

What do you do on the Internet pages oriented towards discussing and/or solving social problems? *The percentage is calculated from the number of the respondents who use civic/social online initiatives (N=50).* The Internet pages oriented towards solving social problems are most often searched for finding relevant information, expanding one's outlook and in general because it is interesting to read different articles and comments. Besides, almost half of the respondents visiting these pages take the opportunity to express their opinion.

Married people and people who cohabitate more often contribute to the initiated projects by presenting possible improvements and their knowledge, and they also find and identify different social problems (the difference is statistically significant). Single people more often look for the like-minded, women find some relevant information and single parent mothers more often state that they simply like reading interesting articles and comments.

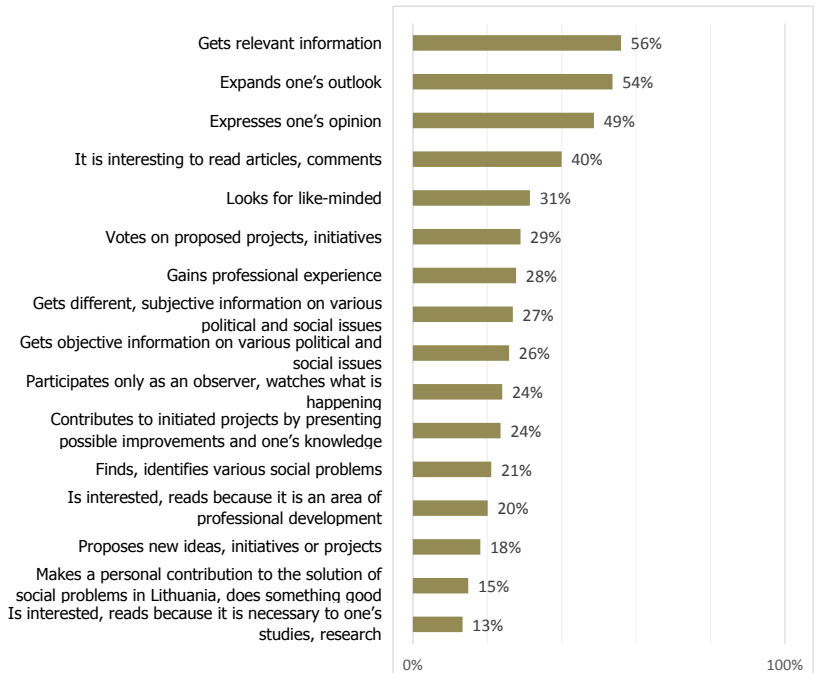


Figure 24. Respondents' activity on the Internet pages oriented towards discussing and/or solving social problems

What concerns the Internet pages oriented towards discussing and/or solving social problems, online communities or initiatives, which topics and activities are relevant to you and interest you the most? *The percentage is calculated from the number of the respondents who use civil/social online initiatives (N=50).* Visitors of the Internet pages oriented towards solving social problems find educational, social, ecological, as well as environmental, climate change-related issues to be the most relevant. Education-related issues are more often emphasized by individuals whose household comprises three members as well as by those who visit the Internet pages of online communities/social networks every day.

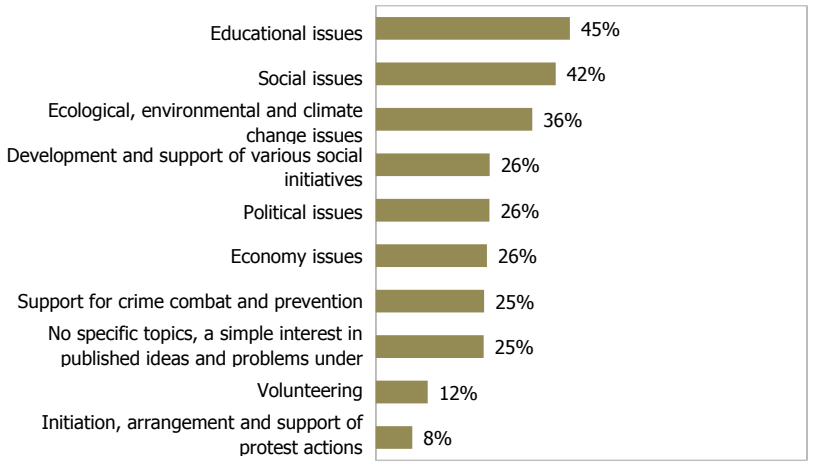


Figure 25. The most relevant topics and activities as reported by the respondents concerning the Internet pages oriented towards discussing and/or solving social problems, online communities or initiatives

4.2.1.4. Evaluation of missing online projects, reasons of non-participation, satisfaction with online socially oriented projects, assessment of the quality of online communication

What content, what type of activity-related Internet pages, online communities or initiatives are missing, is there a lack of them? *The percentage is calculated from the number of the respondents who use civil/social online initiatives (N=50).* According to the opinion of almost half of

the respondents visiting the Internet pages oriented towards solving social problems, at present there is no lack of the Internet pages oriented towards solving social problems, online communities or initiatives. Respondents who have higher education and reside in other than the 3 biggest cities of Lithuania stated less frequently (the difference was statistically significant) that on the Internet pages they did not find anything that was missing.

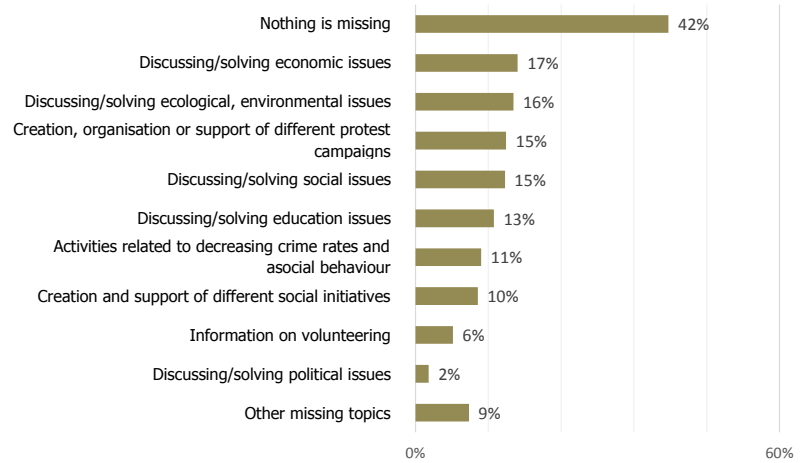


Figure 26. The content, type of activity of the Internet pages, online communities or initiatives that the respondents report as missing

Why do you not use the Internet pages/are you not registered with online communities or initiatives oriented towards discussing and/or solving social problems? *The percentage is calculated from the number of the respondents who use the Internet, but who do not know, do not participate in the virtual activity oriented towards solving social problems (N=626).* Those Internet users who do not know, do not participate in the virtual activity oriented towards solving social problems most often state that this is not interesting or that they do not have time for such type of things.

A small part (1–3 percent) of the respondents in question state that they do not participate in the virtual activity oriented towards solving social problems because it is dangerous – they are afraid of being suspected of a selfish activity, being threatened, bullied and even suffer physically, also they are afraid of losing their job.

The Internet users, including women, single men and single women,

state more often that they do not participate in this activity because it is not interesting. Respondents who state more often that they do not have time to participate in this activity are 50-59 year-olds bringing up two or more children as well as those who are not registered and do not use the Internet pages of online communities or initiatives.

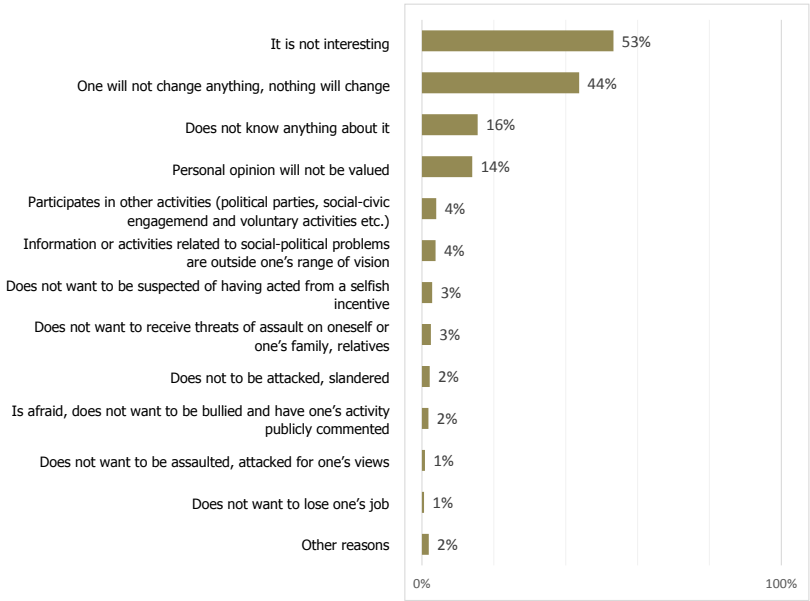
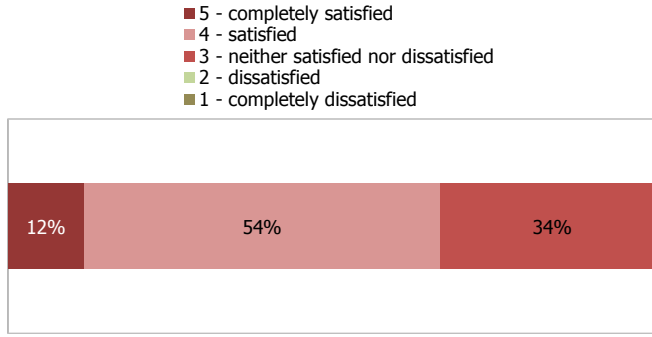


Figure 27. Respondents' reasons for not using the Internet pages/not being members of online communities or initiatives that are oriented towards discussing and/or solving social problems

Evaluating in general, to what degree are you satisfied with virtual communication on the Internet seeking to discuss or solve social-political problems? *The percentage is calculated from the number of the respondents who use civil/social online initiatives (N=50).* Users of civil/social online initiatives are most often satisfied with virtual communication on the Internet seeking to discuss or solve social-political problems, the average of those who are satisfied with virtual communication being 3,8 points from the total of 5 points.



Average – 3,8 points

Figure 28. Respondents' satisfaction with virtual communication on the Internet seeking to discuss or solve social-political problems

Respondents who have vocational education are more satisfied with virtual communication on the Internet while seeking to discuss or solve social-political problems.

In respect to virtual communication while seeking to discuss or solve social-political problems, what is that which you lack the most or miss the most? *The percentage is calculated from the number of the respondents who use the Internet (N=675). While communicating virtually on the Internet, both users of the Internet pages oriented towards discussing and solving social problems and those who do not visit these pages miss the same things, including respect, communication culture, competence and participants" experience.*

Users of these Internet pages miss the culture of communication, competence, the real impact of solving social-political problems, the real voice of the society, structure and clarity of topics, freedom to express one's opinion, relevant topics/communities, and convenience of technologies more than those who do not visit these pages.

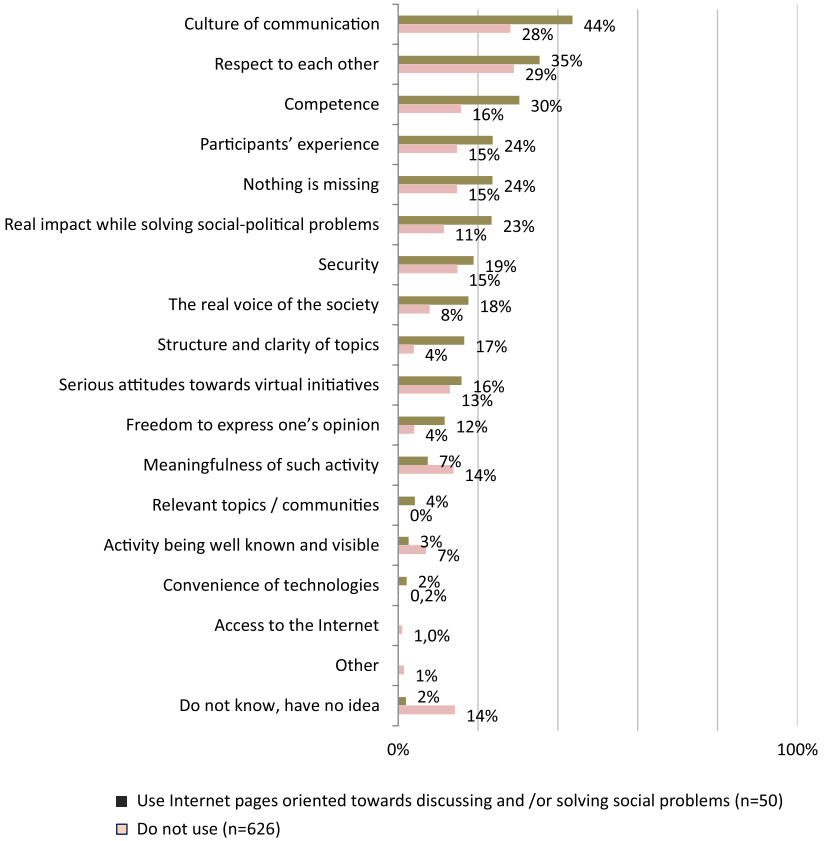


Figure 29. Shortcomings of virtual communication while seeking to discuss or solve social-political problems as reported by the respondents

The opinions of users of the Internet pages oriented towards discussing and solving social problems within different socio-demographic groups are very similar, whereas single men and single women users of these pages mostly stress lack of communication culture. On the other hand, users having higher education mostly emphasise lack of respect, and self-employed users, students and pupils as well as single men and single women users mostly underline lack of competence.

How do you evaluate different aspects of virtual communication? *The percentage is calculated from the number of the respondents who use the Internet (N=675).* The Internet users evaluate different aspects of virtual

communication quite favourably, the lowest average of evaluation being 3,4 points from the total of 5 points. The Internet provided possibilities, such as to find the like-minded, expand one's outlook, get to know more, access the information of one's interest, have the possibility to express one's opinion, propose new ideas and initiatives as well as get more objective information on different political and social issues, are evaluated the best.

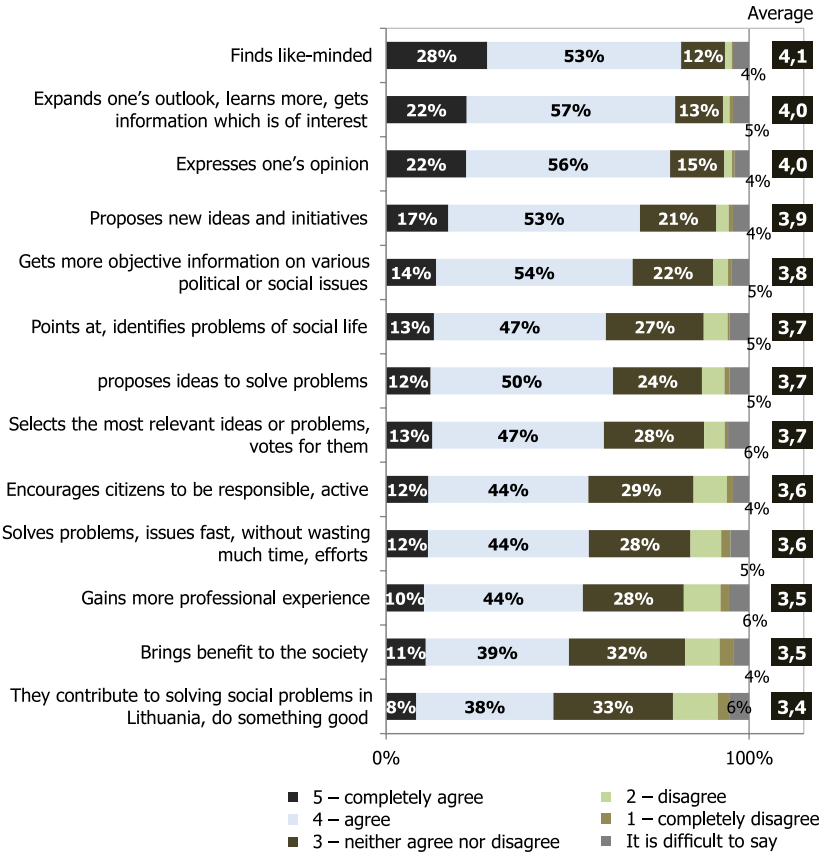


Figure 30. Evaluation of virtual communication aspects

The top five aspects of virtual communication that receive the best evaluations are most often underlined by 20-29 year-old Internet users, students, pupils, single men and single women and those who use the Internet pages of online communities and social networks.

4.2.1.5. Evaluation of ensuring security of virtual communication

The percentage is calculated from the number of the respondents who use the Internet (N=675). The majority (more than 70%) of the Internet users agree that strict responsibility has to be foreseen against those members of an online community who violate another person's rights, that the administrators of these pages have to take responsibility for the contents spread via them, that information presented on these pages has to be controlled by their administrators, and that the activity of online communities has to be comprehensively regulated by law. These Internet users agree that there exists a problem of identity theft (e.g., a famous person's fake profile or blog is created) and that there is much more intolerance and defamation online than in real life. Aspects that are most often agreed upon are most often stressed by the respondents who live in other than the three biggest cities of Lithuania.

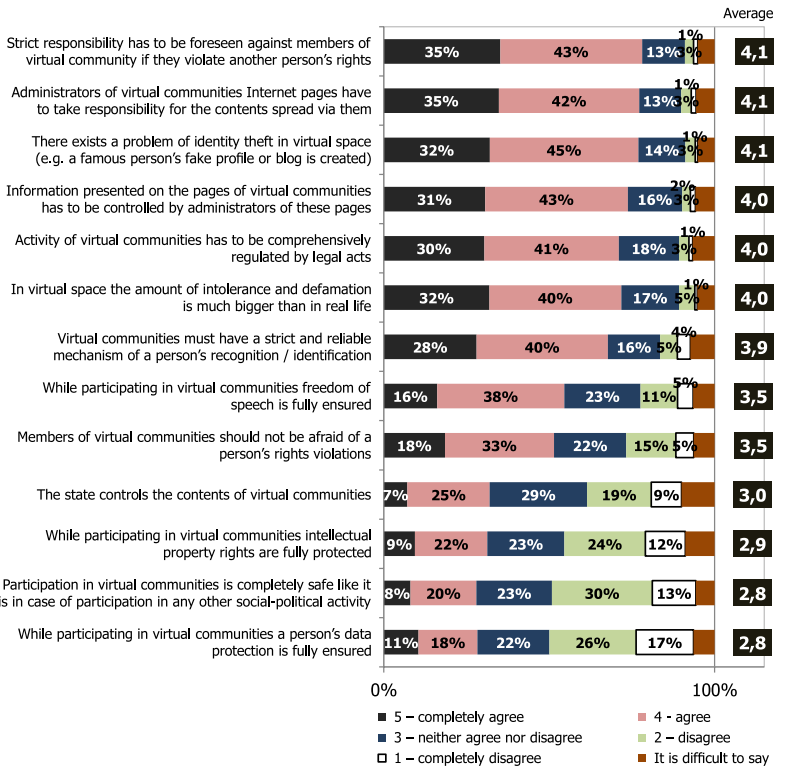


Figure 31. Evaluation of ensuring security of online communication

4.2.2. The Profile of CI Emergence Actors and Their Participation in Developing Collective Intelligence

4.2.2.1. Participation in the development of Collective Intelligence

As it has been already mentioned, more than half (60%) of the Internet users visit the pages of online communities and/or the pages of social networks at least once a month (35% of the users visit them daily, 15% do that a few times a week, and 12% – once a week and less often), whereas only 7% of them use the Internet pages oriented towards discussing and solving social problems. *The percentage is calculated from the number of visitors of the pages of online communities and/or social networks (N=414).*

The pages of online communities or those of social networks are used more often (the difference is statistically significant) by the daily Internet users who are 15-19 years old and 20-29 years old, those who have primary education, basic education, students and pupils, single men and single women and those living in households made up of 3 or 4 members.

These pages are visited *a few times a week* by users who have 2 or more children, and they are used *once a week or less frequently* by 30-39 year-old users, whereas those who are *not registered or do not use these pages* are more frequently 40 year-olds or older Internet users whose education is vocational, who are employees, the retired, the married, cohabitees or divorcees, widows/widowers as well as persons living alone.

The Internet pages oriented towards discussing social problems and solving social problems are used more frequently (the difference is statistically significant) by those in whose household there is one child and by those who are the daily users of online communities/social networks.

Thus, the daily or "strong" visitors of these pages can be called "young enthusiasts", and they account for the biggest part of the visitors of the pages of online communities and/or social networks. The proportion of "medium" and "weak" visitors, who are slightly older than the young enthusiasts, is very similar.

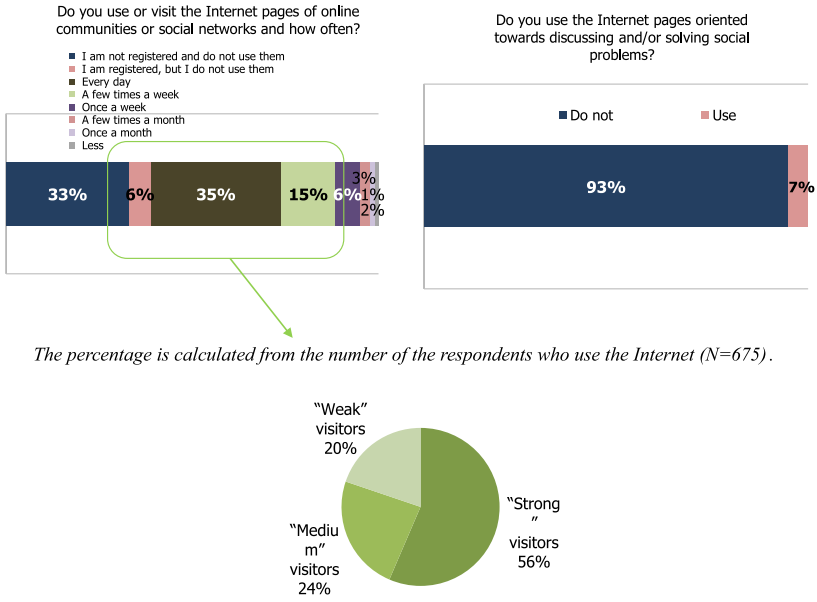


Figure 32. Participation in emerging of Collective Intelligence

4.2.2.2. Visiting the Internet pages of online communities and social networks vs. visiting the Internet pages oriented towards solving social problems

7 percent of all Internet users visit both the pages of online communities, social networks and the Internet pages oriented towards solving social problems.

Half of all Internet users use *only* the pages of online communities and social networks.

Only 0,4 percent of all Internet users use *only* the Internet pages oriented towards solving social problems.

38 percent of all Internet users visit neither the former nor the latter pages. *The percentage is calculated from the number of the respondents who use the Internet (N=675).*

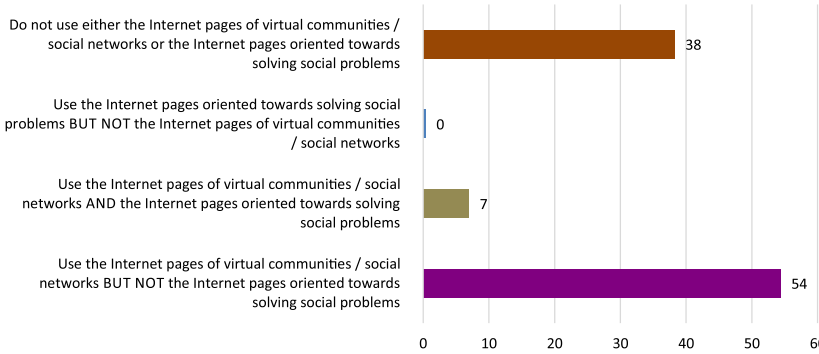


Figure 33. Visiting the Internet pages of online communities and social networks vs. visiting the Internet pages oriented towards solving social problems

The pages of *both* online communities, social networks *and* the Internet pages oriented towards solving social problems are used by those whose education is vocational (the difference is statistically significant). The pages of *only* online communities and social networks are more frequently used by the Internet users who are 15-29 years old, whose education is primary, basic and secondary, by single men and single women. Those who visit neither the former nor the latter pages are more frequently the Internet users who are 40 years old and older, whose education is vocational, and who are married, cohabitees or widows/ widowers.

4.2.2.3. The profile of CI developers

Developers of Collective Intelligence are the Internet users who at least sometimes use the possibility to search the Internet pages of online communities and/or social networks and those who use the Internet pages oriented towards discussing social problems and problem-solving. The former Internet users fall into three groups, i.e., "strong" (use it daily), "medium" (use it few times a week) and "weak" users (use it once a week and less frequently).

In this chapter, internal analysis carried out within the two groups of Collective Intelligence is presented ("strong", "medium" and "weak" visitors of the Internet pages of online communities and/or social networks are compared, as well as users of the Internet pages oriented towards discussing social problems and problem-solving and those who do not use these page

are compared) from the perspective of several essential aspects of virtual communication, including frequency of the Internet use, the overall purposes of the Internet use, the purpose of using online communities or social networks and satisfaction with aspects of virtual communication.

"Strong" visitors of online communities and/or social networks and those who use the Internet pages oriented towards discussing social problems and problem-solving use the Internet more frequently.

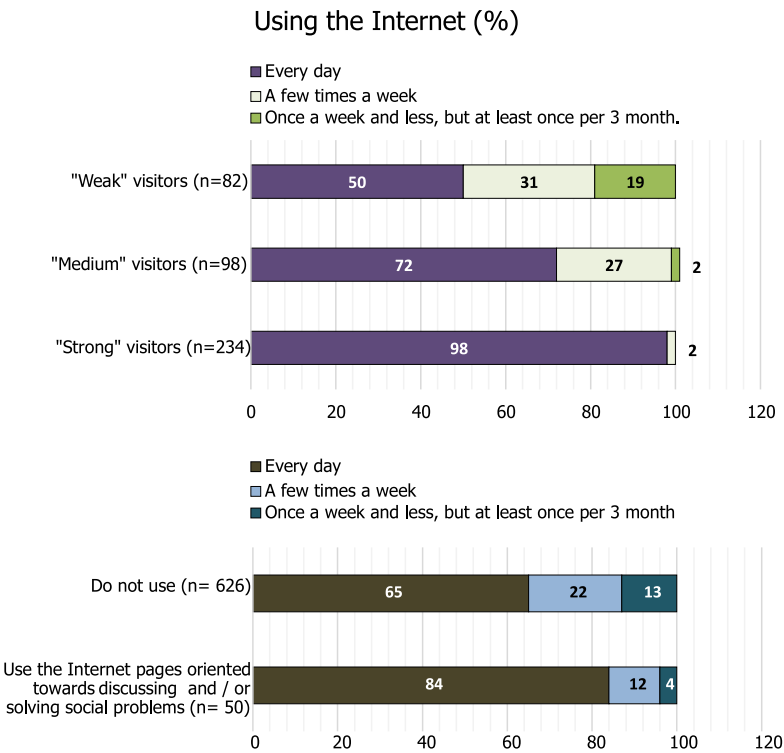


Figure 34. Developers of Collective Intelligence

"Strong" visitors of the pages of online communities and social networks use the Internet more frequently for almost all most commonly used purposes. The Internet users who use the pages oriented towards discussing social problems and problem-solving use the Internet more frequently for both personal communication and professional communication for personal purposes.

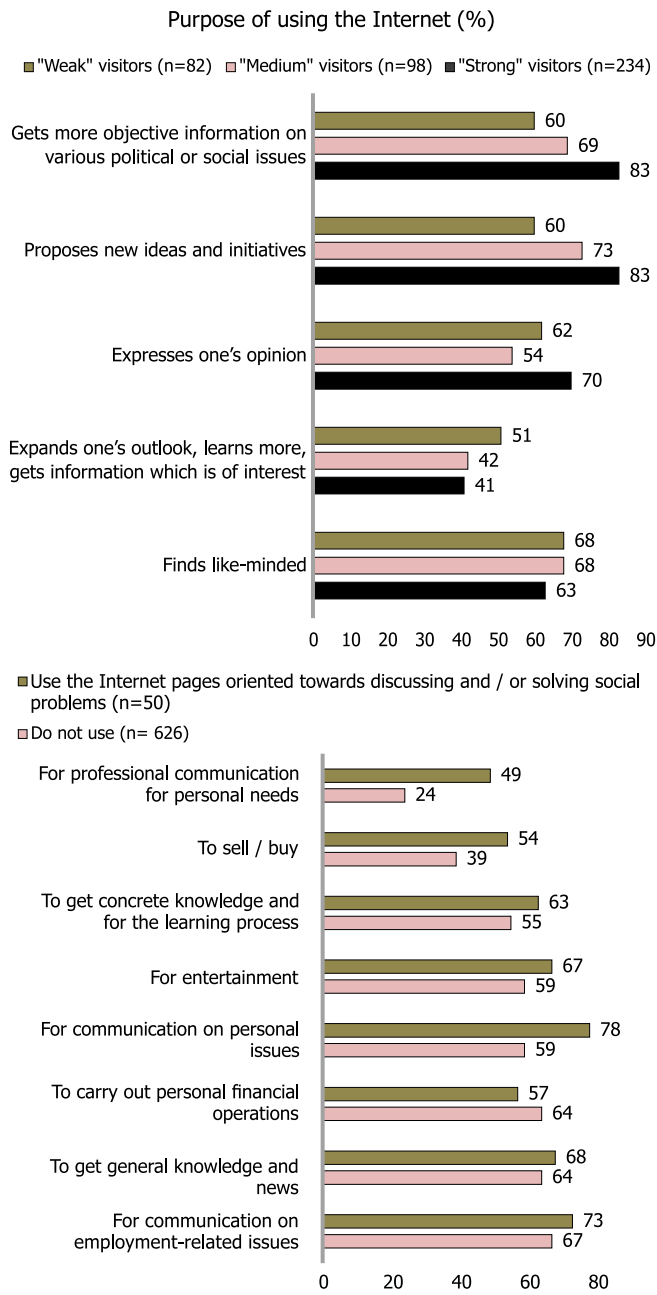


Figure 35. Developers of Collective Intelligence

"Strong" visitors of the pages of online communities, social networks and those Internet users who do not use the Internet pages oriented towards discussing social problems and problem-solving (both of them use online social networks) visit online communities and social networks more frequently for the entertainment purposes.

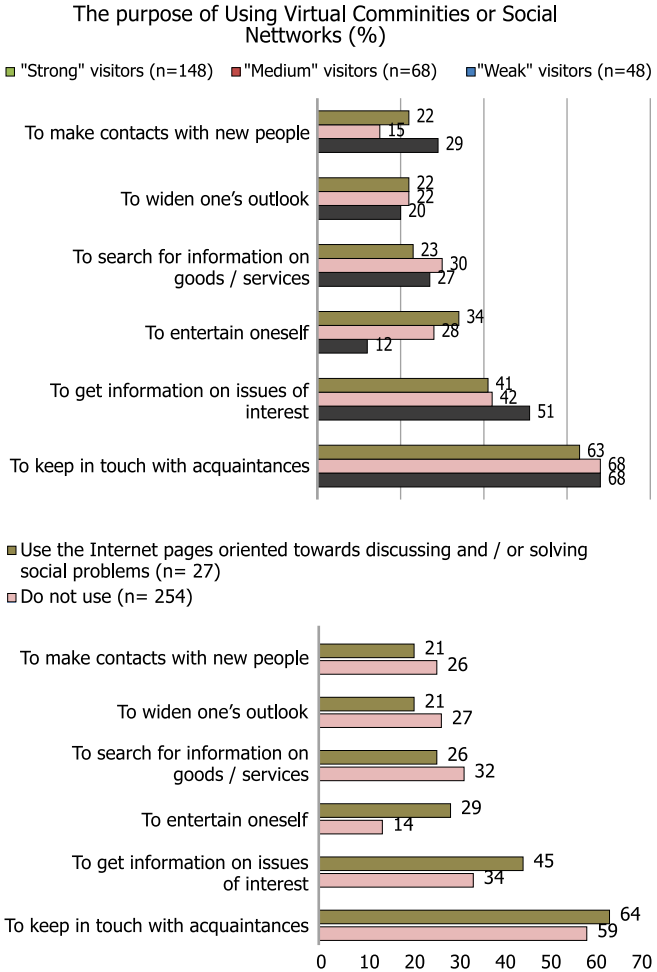


Figure 36. Developers of Collective Intelligence

"Strong" visitors of the pages of online communities, social networks and those Internet users who do not visit the Internet pages oriented towards discussing social problems and problem-solving are more frequently satisfied with most aspects of virtual communication.

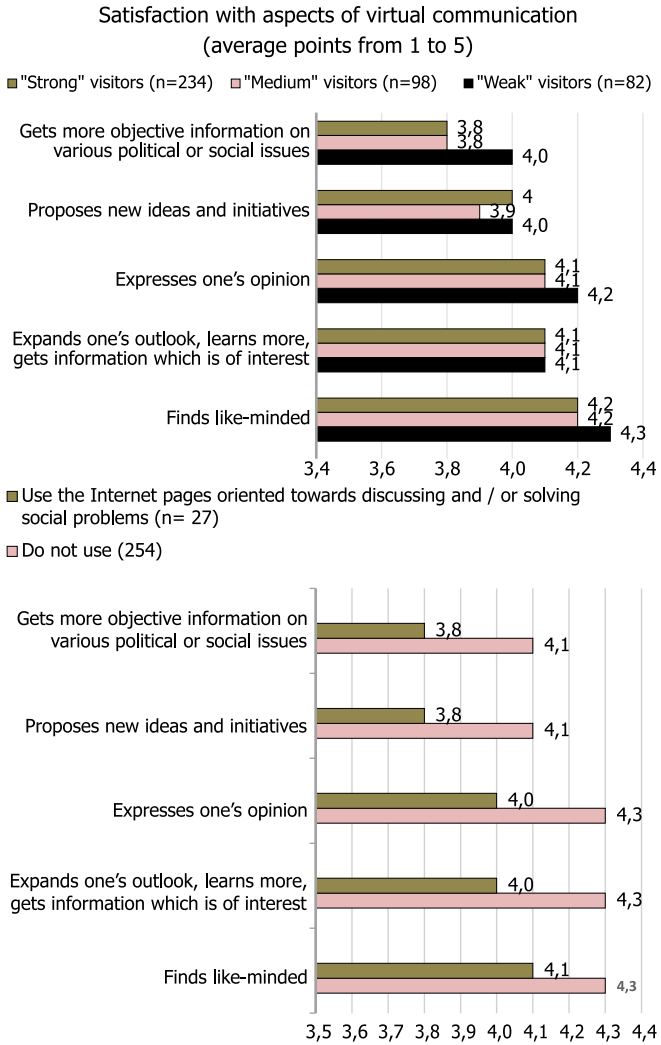


Figure 37. Developers of Collective Intelligence

4.2.3. Summary of Quantitative Analysis Results

63% of the respondents use the Internet at least once a week and more frequently, and approximately one third of Lithuania's population of 15-74 year-olds use the Internet less frequently than once a month or does not use it at all. 44% of the research participants use the Internet on a daily basis. The Internet is used for work-related communication, to get general knowledge and news, carry out personal financial operations, for personal communication, entertainment and to gain specific knowledge/for the learning process (stated by 56-67% of the Internet users), and the Internet is used least frequently (stated by 21-26% of the Internet users) to express one's opinion or share knowledge as well as for professional communication for personal needs. 61% of the Internet users (41% of all residents) use pages of online communities or social networks; one third (35%) of the Internet users visits them daily, one fifth (21%) of them visits these pages at least once a week. Therefore, the Lithuanian society's common potential for the emergence of Collective Intelligence is far less than the residents" possibilities to participate in the activities of distant communication.

The use of the pages of online communities or social networks and participation in their activities (one not only reads, is interested in, collects information, but also writes, comments, shares experience) are connected with the area of personal interest, hobbies (74% use the pages, 64% participate in their activities) and with studies/learning (26% use the pages, 19% participate in their activities). The communities and social networks are used to maintain contacts with acquaintances and find information on issues of one's interest (64% and 44% of all responses, respectively), for entertainment (28% of responses) and for the search of information about goods and services (26% of responses). The least frequently mentioned purposes of using the Internet (1-3% of responses) include supporting ideas, joining initiatives or projects initiated by other people, making certain decisions (e.g., voting for some initiatives, choosing somebody to make a donation to, etc.). This practice illustrates a rather passive attitude of the Internet users towards the possibility to actively contribute to solving social problems raised by the active part of the society.

What concerns the visibility of Lithuanian news portals and civic initiatives, it is established that the absolute leader among Lithuanian portals on the national level is the news portal Delfi.lt (reported as the

best-known news portal by 84% of the Internet users). What concerns the regional leader, the visibility of local news portals is rather low (the visibility of the most frequently mentioned local news portals, including *Vilniausdiena.lt*, *Kaunodiena.lt*, *Skrastas.lt*, *Kaunozinios.lt*, does not exceed 7%), whereas the most well-known Internet project implemented online is Darom.lt (reported by 19%) and it is also the best-known online civic initiative (reported by 41%). However, only a few respondents know about and participate in the online civic initiatives (e.g., *Lietuva 2.0.lt*, *Aš Lietuvai.lt*) which have the most developed technologies enabling the emergence of Collective Intelligence.

The Internet pages oriented towards solving social problems are used by 7% of all Internet users (5% of all residents). Those Internet users who do not know and do not participate in virtual activities oriented towards solving social problems most often state that this is not interesting or that they do not have time for such things. On the other hand, lack of such pages is not reported neither as the reason for not using them, nor as the specificity of the Internet (42% of those who use civic/social online initiatives think that there is no lack of the Internet pages, online communities or initiatives). These research results confirm that in the Lithuanian society until the present time there is still lack of civic activity and initiative.

Respondents most frequently get relevant information, expand their outlook on the Internet pages oriented towards solving social problems as well as find it interesting to read various articles and comments. Educational, social as well as ecological, environmental and climate change-related issues are the most topical for the users of the Internet pages (the hypothesis *H8. CI system has the potential for CI emergence when it demonstrates adaptability to socio-cultural context was confirmed*). However, such reasons of using the Internet highlight respondents" passive participation rather than an active wish to contribute to the creation of intellectual values. The most valued aspects of the Internet use include the possibility to find the like-minded, expand one's outlook, get to know more, get the information of one's interest, have an opportunity to express one's opinion, propose new ideas and initiatives, as well as get more objective information about different political or social issues (the evaluation averages are 3, 8–4, 1 points from the total of 5 points) (the following hypotheses were confirmed: *H1. CI system has the potential for CI emergence when the system is open, dynamic and flexible;*

H2. CI system has the potential for CI emergence when it demonstrates the capacity for creating collective knowledge; H3. CI system has the potential for CI emergence when it demonstrates the capacity for independent decision-making and collective problem-solving). The top five best valued aspects are underlined by 20-29 year-old Internet users, students, pupils, single men and single women and by those who use the Internet pages of online communities and social networks.

The analysis results of the relationships among the pages of online communities, social networks and the Internet pages oriented towards solving social problems show that only 7% of all Internet users participate both in the activity of online communities and social networks and use the Internet pages oriented towards solving social problems. However, the majority (54%) use only the pages of online communities and social networks. Only 0,4% of all Internet users participate only in the activity of networks solving social problems. 38% of all Internet users do not visit either the former or the latter pages.

What concerns participants of the emergence of Collective Intelligence, it is important to mention that the daily ("strong") visitors of the pages of online communities and/or social networks can be called "young enthusiasts" (they are more frequently under 39 years old, have higher education, are students, pupils, single men and single women, families of three or four members, having a child, the research participants whose income per person per month on average exceeds 1000 Litas or the respondents who have not specified their income, and residents from the 3 major cities) and that they account for the biggest part of visitors of these Internet pages (56%). The percentage of "medium" and "weak" Internet users, who are slightly older than the young enthusiasts, is very similar, i.e., 24% and 20%, respectively.

"Strong" visitors of the Internet pages of online communities/social networks use the Internet more frequently in general and use it more often for almost all purposes, as well as are more frequently satisfied with most aspects of virtual communication. Similarly, those who use the Internet pages oriented towards solving social problems are more frequent users of the Internet (they also use the Internet pages of online communities/social networks more frequently), are satisfied with most aspects of virtual communication, and they use the Internet both for the purpose of personal communication and professional communication for personal needs (the following hypotheses were confirmed: *H9. CI system has the potential*

for CI emergence when the motivating factors are correctly identified and appropriate mechanisms to motivate the users created; H7. CI system has the potential for CI emergence when it demonstrates a balance between the task of the community and participants).

Those who use civic/social online initiatives are most frequently satisfied with virtual communication while seeking to discuss or solve social-political problems (the average of their satisfaction with virtual communication reaches 3,8 points from the total of 5 points). Both those who use the Internet pages oriented towards discussing and solving social problems and those who do not use them report similarly that while communicating virtually, there is lack of respect, communication culture, competence and participants" experience (the hypothesis *H4. CI system has the potential for CI emergence when it demonstrates competencies for transparent self-organisation was confirmed*).

Security is one of the most significant needs of the members of virtual communication networks. The majority of the Internet users (70%) agree that strict responsibility has to be foreseen against those members of online community who violate another person's rights and that the administrators of these pages have to take responsibility for the contents spread via them. According to the respondents, the presented information has to be controlled by the administrators of these pages, whereas the activity of online communities has to be comprehensively regulated by legal acts. These respondents also agree that in virtual space there exists a problem of identity theft (e.g., a famous person's fake profile or blog is created), as well as that the amount of intolerance and defamation is much bigger here than in real life (the hypothesis *H6. CI system has the potential for CI emergence when it offers security and privacy in the network was confirmed) (for more detailed information, see chapter 4.3*).

4.3. The Legal Perspective: Importance of Security in Online Communication

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Cyber security is one of the fields which must be analyzed in the context of civil engagement via online communities. Social technologies create an illusion of safe and simple communication, thus, in reality these rapidly developing tools also create a new area for crimes and other violations of human rights. While people act on the web, they must preserve their personal data, refrain from certain actions, which may violate rights of other people, etc. (Skaržauskienė and Paražinskaitė et al., 2014). Having in mind these facts, it is clear that people, who engage themselves into any Internet based activities, should be aware of the risks, which may exist. This chapter focuses on the analyses of legal issues of cyber security that were identified during the empirical research (public opinion survey, conducted in 2013) on the involvement process of online communities in different civil activities. Mainly, aspects, such as privacy of people, security of their personal data, demand for obligatory identification and Internet censorship, are revealed. This part of the monograph mostly focuses on hypothesis H6 – *CI system has the potential for CI emergence, when it offers security (privacy and legal issues) in the network*.

In this monograph, the concepts of social technologies and Collective Intelligence have been already revealed. Thus, these two concepts have a deep relation with civil engagement, too. It is clear that the interaction between the concepts of social technologies and civil engagement creates an environment, where Collective Intelligence has all opportunities to emerge and be used (Skaržauskienė and Paražinskaitė et al., 2014). It even can be

presented as one of the best examples how social technologies can improve social life of society by creating wide accessibility for civil engagement of all people, who are inclined to socially-oriented activities. Thus, a great idea is not enough, because it only creates opportunities. To be implemented, an idea must be materialized, adopted for a certain society and communicated well for the targeted audience. Also, before the full employment of social technologies for the civil engagement of people, many risks must be evaluated. Mostly, these risks are in one or another way connected with cyber security, which should be understood as protection against disruption and misuse of Internet facilities (Gradi and Parisi, 2006). Social technologies, as a medium between people and bodies to make decisions, has not only created comfortable platforms for spreading the ideas, but also presented opportunities to evaluate and improve individual ideas and convert them into collective intellectual productions, which due to synergistic effects have undoubtedly new quality and applicability (Skaržauskienė and Paražinskaitė et al., 2014). These insights draw attention towards cyber security issues, because it is necessary to build a safe and reliable environment for people, who desire to engage themselves into socially-oriented activities and want to share their ideas for the greater welfare of society.

Lithuania is not an exception in the context of Central and East European countries, and is facing the problem of low civil engagement of residents into decision-making process level. According to the results of public opinion survey (Vilmorus, 2012), a majority of respondents (Lithuania residents) are not active in participating in activities connected with civil engagement. For example, during the last five years, only 12 percent of respondents signed petitions or took part in commenting on the web some social, political or economic questions, only 9 percent of respondents were involved in public discussions as well as only 4 to 8 percent of respondents were involved in other civil activities (protests, demonstrations, etc.). Taking into consideration the participation in activities of various organizations, people are mostly involved in leisure interests groups (about 26 percent) when compared to 4-13 percent that are involved in religious, NGOs and political organizations. Despite the fact that a majority of respondents confirmed that Lithuanians are too passive in the field of civil engagement, experience shows that these issues are not personal priorities for them, personally. It means that people understand the benefits of civil engagement, but personally do not take these responsibilities and trust others to take it.

Social technologies are able to create an easier access for community members to participate in different decision-making processes. This issue must be reasonably analysed since the fact that social technologies are accessible to a majority of the residents (Skaržauskienė and Paražinskaitė et al., 2014). In the third quarter of 2013, more than 75 percent of Lithuanian residents (aged 16-74) were using computers and the Internet, with more than 28 percent of residents using the Internet from their portable devices, such as mobile phones or tablets (Information Society Development Committee under the Ministry of Transport and Communications, 2013). Moreover, in 2012, Lithuania, according to FTTH Council Europe, still remained the leading country in Europe with the number of households using fiber-optic Internet. Taking into consideration the factors of low civil engagement and high Internet accessibility, it may be concluded that all opportunities for transferring civil engagement activities do exist. Thus, despite this, it is worth to draw attention towards the existing situation in the field of online communities and networks in Lithuania (Skaržauskienė and Paražinskaitė et al., 2014). The growth of the number of online socially-oriented communities is often observed. Therefore, most new players that are not connected to the government sector or other institutions authorized to make decisions contribute to the fact that a larger part of initiatives remains unrealized (Mačiulienė, Leichteris and Mačiulis, 2013). Of course, such lack of functionality leads to the declination of trust. The mentioned issues, thus, provide a basis for exploring the field of online civil engagement more, with a focus on the reasons that discourage individuals to involve themselves in online communities for social-oriented activities (Skaržauskienė and Paražinskaitė et al., 2014).

The above concluded propositions actually present opportunities but not a guaranteed realization of broad application of social technologies for socially-oriented activities. In Lithuania, usage of social technologies has one paradox: residents enjoy using technologies for work, leisure and personal every day needs, but most of them are not active users of various socially-oriented platforms (Skaržauskienė and Paražinskaitė et al., 2014). If more than 75 percent of residents (aged 16-74) have an access to the Internet (IVPK, 2013), why are there 4-12 per cent of population involved in socially-oriented activities? (Vilmorus, 2012). The low level of civil engagement in Lithuania has encouraged authors to perform theoretical research, which aims to identify the main risks of developing

Collective Intelligence in the network society (Skaržauskienė et al., 2013). The theoretical research showed that frequent involvement in online communities meets risks, such as information disclosure, infringement of privacy, threats for personal data, threats for intellectual property, censorship (possibly initiated by administrators or State) and other types of violations of rights and obligations (for example, hate crimes, committed in virtual space). Systematic analysis of these five major risks states that all of them are within the field of investigation of cyber security. According to the results of previous theoretical research, 13 propositions for public opinion survey were identified (see Table 24).

Table 24. Propositions for public opinion survey on cyber security related issues

No.	Proposition	Cyber security issue
1.	Participating in online communities is fully safe, as participation in social – political activities in real life	All issues
2.	Members of online communities should not be afraid of violation of their rights	Other type of violation of rights and obligations
3.	Personal data security is fully ensured during the participation in online communities	Threats for personal data
4.	The rights of intellectual property are fully observed taking a part in online communities	Threats for intellectual property
5.	The freedom of speech is fully guaranteed acting in online communities	Other type of violation of rights and obligations
6.	State controls the content of Internet	Censorship
7.	There is much more intolerance and defamation in virtual space to compare with real life	Other type of violation of rights and obligations
8.	The possibility to steal your identity exists in virtual reality	Threats for personal data
9.	The activities of online communities should be regulated by law in detail	Other type of violation of rights and obligations
10.	The information, provided in web sites of online communities may be controlled by administrators of web site	Censorship
11.	The administrators of online communities should take the responsibility of the content, which is spread	Other type of violation of rights and obligations
12.	Online communities must have strict and trustful system of authorization of members	Information disclosure/ Threats for personal data
13.	Strict responsibility of online community members for the violation of rights of other individuals must be envisaged	Other type of violation of rights and obligations

Source: Skaržauskienė and Paražinskaitė et al. (2014)

4.3.1. Profile of Frequent Internet User in Lithuania

During quantitative research (public opinion survey), which was conducted in November – December 2013, legal aspects of civic engagement were covered. According to the results of it, in this part of the chapter, it is worth to construct the profile of frequent Internet user in Lithuania. As it was mentioned above, Lithuania is facing a low level of civil engagement. One of the goals of this monograph is to reveal the legal problems that might limit civic engagement via networks, as well as create obstacles for the emergence of Collective Intelligence as a more effective intellectual instrument for overcoming social challenges. Further, analysis of public opinion survey will be presented. Main attention will be drawn towards composing the profile of the user based on legal risks related to deeper involvement into activities of socially-oriented platforms. According to the results of public opinion survey, all respondents can be divided into 6 groups, but only three groups gathered more than 10% of the respondents. These groups are represented in Table 25.

Table 25. Frequency of using the Internet

Frequency	Results
Every day	44%
Few times a week	14%
Once a week	5%
Few times per month	2%
One per month and less, but minimum once per 3 month	1%
Less than once per 3 months/Not using at all	34%

Source: Skaržauskienė and Štitilis et al. (2014)

It can be noticed that 44% of the respondents use the Internet every day, and only 34% use the Internet infrequently (less than one time per three months) or do not use it at all. The remaining 22% use the Internet less than few times per week. It can be noted that most frequent Internet users are younger (39 years old or less), well-educated people living in 3 biggest cities of the country ($p<0.05$). Respondents, who do not use the Internet or use it very rarely, usually are 50-74 years old, living in rural areas of the country and have lower income ($p<0.05$) (Skaržauskienė and Štitilis et al., 2014).

In general, most popular activities online appear to be communication related to professional aspects of life (67% of the respondents have chosen this option). Activities related to generation of general information and knowledge are close second (65%). However, Internet users who use the Internet more than few times a week are not always active in visiting socially-oriented websites ($p<0.05$). As will be discussed later, socially-oriented activities are not listed among the most popular activities online. Figure 38 below shows what activities are most popular online in Lithuania (Skaržauskienė and Štitilis et al., 2014).

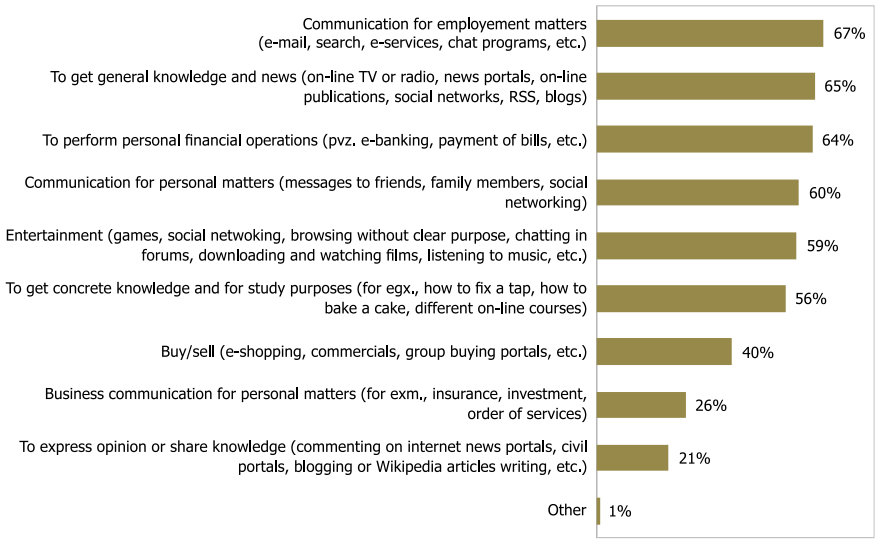

Figure 38. Most frequent activities on the Internet

Source: Skaržauskienė and Štitilis et al. (2014)

Only 21% of the respondents answered that they share their opinion or knowledge online (comment in various websites, community forums, blogs, etc.). This reveals that Lithuanian people are not inclined to participate in socially-oriented activities neither offline, nor online. These findings encourage to further research low civic engagement.

Personal communication using online channels was indicated as one of the most popular options by the respondents. 61% of the respondents use various websites of online communities and social networks and only 33% of the respondents are not registered to such activities. 6% of the respondents

said that they have accounts but do not use them. Most active users of social networks and online communities are people aged 15-29 ($p<0.05$). Most popular and best-known social network in Lithuania is Facebook (82% of the respondents, who use the Internet, mentioned it). A different situation can be observed when the respondents were asked to name socially-oriented networks operating in Lithuania. Only one well-advertised network *www.darom.lt* gathered 41% of the respondents. Other projects were mentioned by less than 20% of the respondents. Deeper analysis shows that the respondents mostly use social networks and online communities in order to pursue personal interests related to hobbies or other areas of personal life (74%). Thus, socially-oriented platforms were not mentioned often.

Table 26 below shows a number of survey respondents interested in visiting platforms tackling societal problems as compared to general online communities and social networks.

Table 26. Visiting websites of online communities and social networks vs. visiting websites oriented towards social problems solving

Option	Result
Uses websites of online communities/social networks (not oriented towards solving of social problems)	54%
Uses websites of online communities/social networks (also oriented towards solving of social problems)	7%
Uses websites oriented towards solving social problems (but not websites of online communities/social networks)	0,4%
Does not use websites of online communities/social networks or other websites oriented towards social problems solving	38%

Source: developed by the authors

The number of people involved in online communities and social networks not oriented towards solving of social problems is 54% of all respondents using the Internet. These high numbers show that the respondents are actively communicating using social technologies. However, the number of respondents involved in activities of socially-oriented online communities and social networks is only 7%. Obviously, people do not involve themselves in socially-oriented activities even if they are organized in familiar online environments. The survey also revealed that more educated people use social networks more frequently ($p<0.05$). It should be noted that people, who are not members of social networks and online communities at

all (38%), are usually 40 years old or older, have only professional education, are married or living with partner ($p<0.05$). In order to proceed with the analysis of quantitative data and for the sake of explicitness, the users were divided into three groups based on their activity in socially-oriented online projects. "Strong users" were identified as respondents, who visit socially-oriented platforms every day. "Medium users" are involved in such activities few times a week. "Weak users" join such socially-oriented networks once a week or less. It is obvious that "strong users" are active in most activities online. That leads to a presumption that the Internet itself is inclusive, which means that people who are acquainted with this technology start to use it more and extensively. "Weak users" of the Internet are very passive considering their involvement in socially-oriented activities online.

Taking into consideration information presented in Figure 39, a comparative analysis of public evaluation of possible applications of online communication will be conducted.

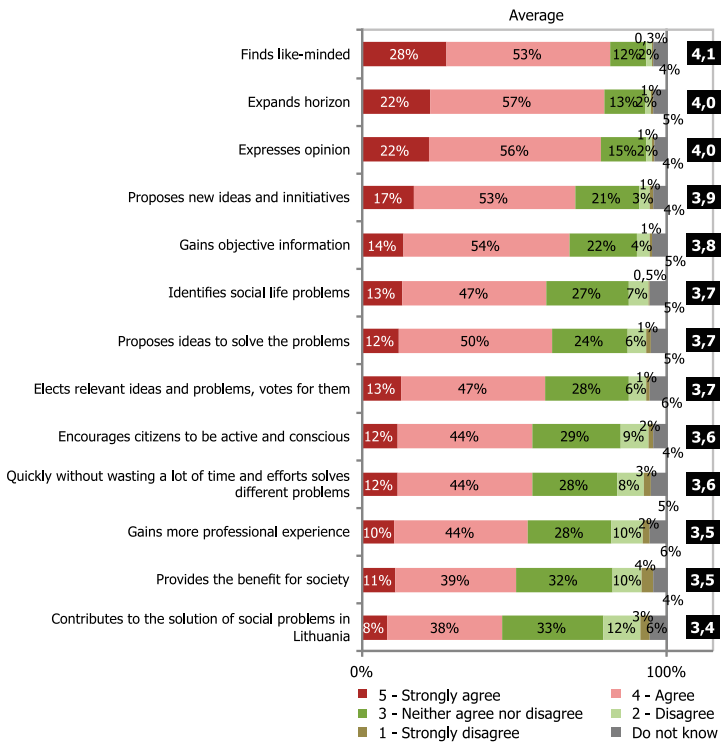

Figure 39. How do you evaluate the different aspects of online communication?

Figure 39 reveals that the respondents know and understand the perspectives and benefits of the Internet-based social involvement. For example, high positions were granted for such active behavior as finding like-minded people, expressing opinion or proposing new ideas. Unfortunately, people do not indicate that they involve themselves in such activities. They rank all possible outcomes more positively than negatively but show no interest into realization of such expectations.

Respondents, who use websites with socially-oriented goals, also were asked to identify what particular activities they perform there; results are presented in Figure 40.

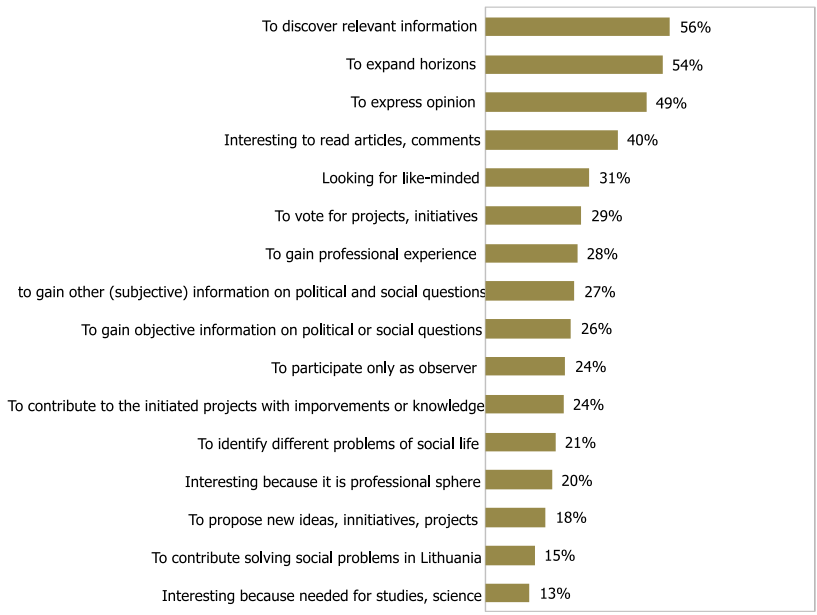

Figure 40. Socially-oriented activities on websites

The data presented above show that most popular activities are quite passive and related only to observation of processes happening in websites, oriented towards social problems solving, e.g., getting relevant information (56%), broadening of views (54%), getting acquainted with interesting information and comments (49%), searching for like-minded people (31%), getting more professional experience (28%) to compare with such active activities as expressing of own opinion (49%), voting for projects or ideas (29%), improving projects by using own knowledge and

skills (only 24%), suggesting new ideas or projects (only 18%) and giving own input for social problems solving (only 15%). Such distinction shows that even those respondents, who are using websites, oriented towards tackling of social problems, mostly are inactive and mainly susceptible to observing the ongoing processes rather than taking part in them.

4.3.2. Privacy and Legal Risks in Online Communication

Having in mind that one of the hypothesis of this research is concerning CI systems potential for CI emergence, when it offers security (privacy and legal issues) in the network, the respondents of public opinion survey also were inquired why they do not use online communities and social networks in general. Most popular answer was the "unacceptable way of communication". Other popular answers included "lack of time" and "having no interest in such activities". From legal perspective, 9% of the respondents chose "the lack of privacy" as a reason for limited use of social networks and online communities. It is interesting that least popular answers are related to a low level of governance feedback to express opinion, danger to express opinion and low security of using it (see Figure 41).

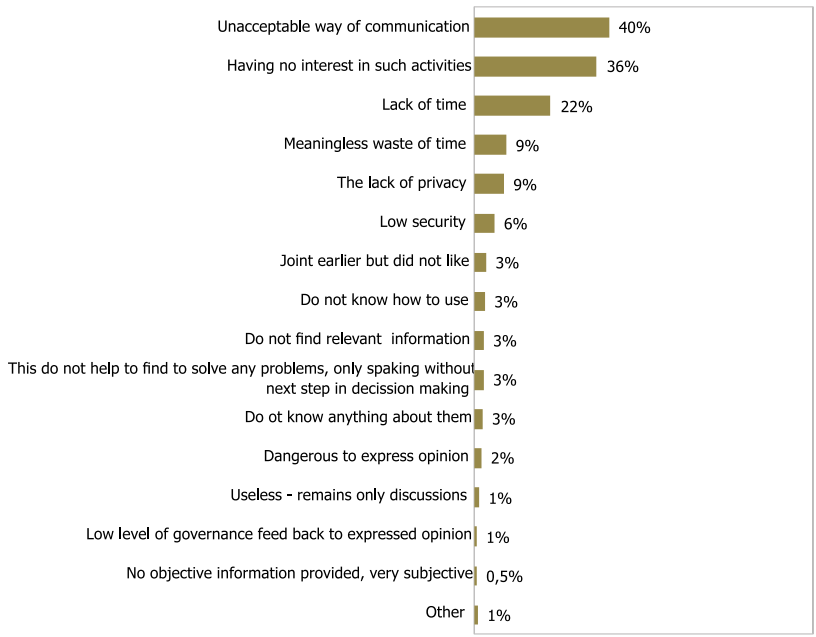

Figure 41. What do social websites lack the most?

In addition, the respondents were asked to list features of socially-oriented online platforms. The results of it are presented in Figure 42. From the legal perspective, only few aspects of the survey can be discussed. First of all, it is the feedback on activities. Only 11% of the respondents noticed that one of the weaknesses of socially-oriented websites is the absence of practical influence of virtual activities on decision-making. Second, the issues of security were mentioned. Only 19% of the respondents identified this choice as a weakness, having in mind that websites, oriented toward social problem-solving, are not secure. From such information, one conclusion can be drawn: the respondents do not consider legal issues of online communication as critically important. Thus, in this area one more paradox arises. When the respondents were directly asked about the advantages in general of using the Internet, they positively evaluated all answers related to socially-orientated activities. The respondents find almost all listed legal risks equally important and have strong opinions (more than 70%) that strict liability of online communities" members must be envisaged if they violate the rights of other people. In addition, it was strictly recommended to think about liability of administrator of networks for the content of networks as well as the need of detail regulation of activities of online communities. Thus, such opinion of the respondents should be evaluated only having in mind the previous answers related to identification of main reasons why people do not involve into socially-oriented Internet projects. If legal aspects were not dominant previously, it is not believable that legal aspects are so important for respondents who are not involved in socially-oriented activities on the web and do not find such activities attractive. Likely, people, who are not involved in such activities, cannot identify by themselves independently what problems they might face.

The importance of this might be confirmed by the fact that more than half of the respondents who gave these answers are male and have higher education degree, which means that they really understand the essence of risks and their importance. Security is almost equally important for both users (19 percent) and non-users (15 percent) of social initiatives. This contrast might be seen in Figure 42.

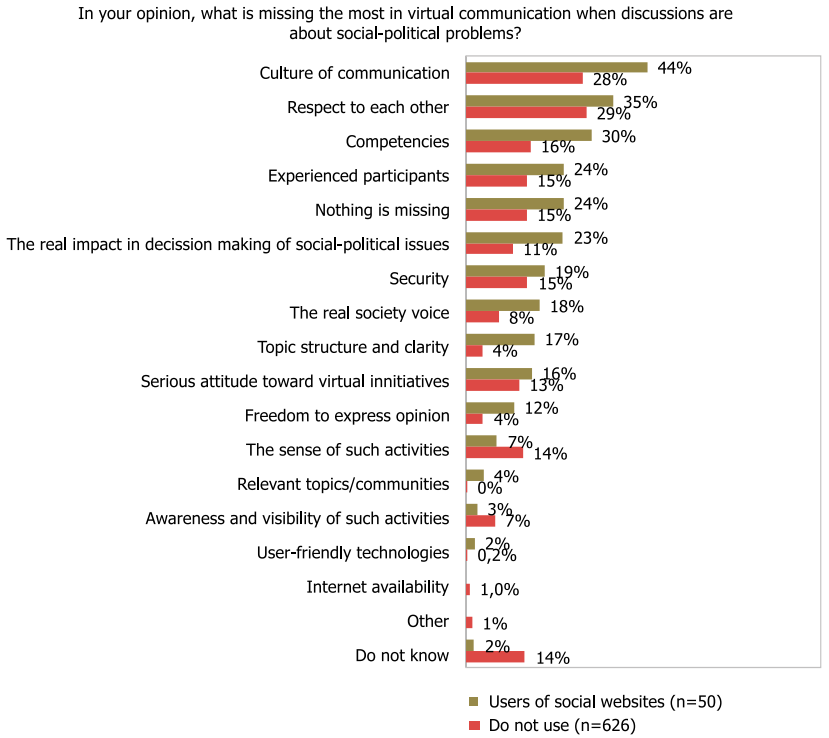

Figure 42. Reasons affecting low participation in virtual communication with the purpose to discuss the social-political problems

Source: Skaržauskienė and Paražinskaitė et al. (2014)

An in-depth analysis on the issues related to cyber security was mentioned in the previous chapter. To evaluate these issues, the respondents were asked to measure on the Likert scale the importance of the mentioned 13 aspects of cyber security as well as averaging of their opinions received. Figure 43, which compares all 13 aspects, shows how varied the agreements and disagreements with the given statements and the average range of the opinions of the respondents.

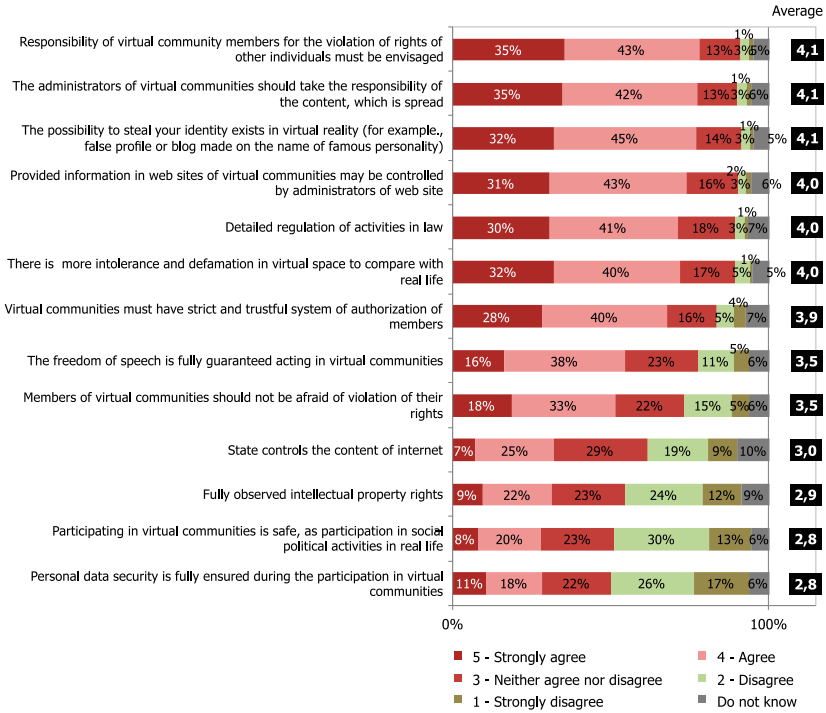

Figure 43. Results from the public opinion survey on the importance of cyber security-related issues

The analysis of the highest four evaluated and four lowest evaluated propositions demonstrates that people are typically worried about threats for personal data and intellectual property as well as violation of rights and obligations. The significant responsibility of online communities" members and online communities" administrator (both opinion average is 4.1) is highlighted, meaning that any type of actions that strengthens this will have to be taken. Not of less importance is the instance that users might be scared that their identity might be stolen (opinion average is 4.1). Finally, censorship is an important key, equally essential for detailed regulation for the risk of intolerance and defamation (all opinion average is 4.0).

Analysis of the four least evaluated possibilities also draws an interesting picture. The statements that the respondents strongly agree or disagree only shows the importance for State control over Internet

content, the lack of attention toward intellectual property in online communities and the fact that neither people feel safe in virtual space, nor they think that their data is secured. While evaluating the first statement, they agreed with the importance of these aspects. Where they disagreed was where their opinion was low on development of these aspects in Lithuania.

In order to confirm or deny the hypothesis H6 "CI system has the potential for CI emergence when it offers security (privacy and legal issues) in the network", it is crucial to take into account quantitative research results, which were presented in this chapter.

Possibilities to adopt social technologies in the field of fostering civil engagement create a great field of research. Virtual networks may serve as a useful tool, which encourages deeper involvement into socially-oriented activities. It may be treated as a new form of civil engagement, which grants more effectiveness and compliance with society needs. It is a more acceptable tool for involvement of citizens into decision-making processes because it is more confirming to the everyday lifestyle of people in the contemporary world.

Thus, stimulation of civil engagement through virtual networks also must face certain legal risks, which were identified in previous scientific works (Skaržauskienė et al., 2013). One of the most important risks is cyber security, such as false identity issue, intellectual property issues and censorship.

Following the previous theoretical input, this chapter focuses on creation of frequent Internet user profile in Lithuania as well as the analysis of legal concerns highlighted by scientists that restricts the broad involvement of online communities in civil activities. The research was based on the results of the public opinion survey, which was conducted in the end of 2013 in Lithuania.

The quantitative research results helped to create the profile of frequent Internet users in Lithuania, where 58 out of 100 people were using the Internet daily or few times per week. It was enclosed that frequent Internet users were younger than 39 years old, well educated, living in the biggest cities of the country. Mostly, they used the Internet for communication or looking for professional or general information. Frequent Internet users use social networks and online communities in order to realize some personal interests, connected mostly with hobbies

or other areas of personal interests. They perform passive activities, such as getting actual information or broadening of view, and mostly escape from active behaviors, such as commenting or sharing information or knowledge. It may be concluded that despite of a high accessibility of the Web in Lithuania, people are not inclined to join socially-oriented activities. This fact creates an obvious finding that accessibility is a condition but not a catalyst for increasing the social involvement of society.

The public opinion survey done for the research paid close attention to the key aspects of active users of virtual communication or reasons that keep away non-users from using virtual tools for civil engagement. The results demonstrate that the respondents are mostly worried about threats for personal data and intellectual property as well as about violation of rights and obligations. Yet, the respondents stated the importance of State control over content of the Internet, the lack of attention toward intellectual property in online communities as well as the fact that neither people feel safe in virtual space, nor they think their data is secured. People using the Internet every day are more often involved in socially-oriented activities, and it could be concluded that digital competencies in general have a positive influence on online civic engagement. Therefore, the research provided a better understanding of different aspects that caused paradoxical usage of social technologies for work, leisure and personal daily needs but not for civil engagement.

These answers clearly emphasize that attention must be paid towards cyber security issues in order to develop safe and reliable environment for people, who wish to engage and generate ideas for greater welfare of society. From the cyber security perspective, the respondents do not rank the legal risks as critically important, but they are aware of cyber security issues and strongly support most of the offered ideas about safe and secure operations online. It shows that people in Lithuania still lack experience in online civic activities and cannot identify independently what problems they might face in virtual space. The united effort is necessary – from the government and law enforcement to the general public – to meet the evolving challenges in securing cyberspace.

4.4. The Emergence of CI in Online Communities (Qualitative Research Results)

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Qualitative research was aimed at deepening and expanding knowledge of the processes of initiation and implementation in online community projects and revealing the circumstances of the Collective Intelligence emergence. Cases of online communities functioning in Lithuania were analysed during the research process. Throughout this research, the term "online community project" is used to refer to a virtual/online environment, place, way or possibility to publicly express one's opinion related to the creation of social welfare. In order to perform an in-depth analysis, face-to-face interview was chosen as the main research method.

The interview method allows evaluation of a wider context and discloses new possibilities to interpret the situation in online projects more flexibly than by measuring numerical values.

In addition, it enables to gain a wide range of information resulting in evaluation of the whole contextual environment and identification of the relationship between the situation and behaviour in an online community. Literature (e.g., Berg, 2007) suggests several limitations of the interview method – biased and subjective interpretation of collected data and ambiguity of respondents" replies. In order to avoid such discrepancies, a standardized interview instrument was used. It included definitions of concepts and terms that were explained to the research participants in advance. Moreover, to attain respondents" positive attitude and cooperation, considerable attention was paid to both the choice of the environment and interview date. To sum up, the choice of the interview

method predetermines some complications, i.e., ensuring research validity and reliability, stimulating respondents" motivation and decreasing subjectivity. However, taking into consideration the multilayer-structure of the researched phenomenon, a limited amount of research in the field and a need of comprehensive understanding in order to describe, explain and operationalise it, the interview method is considered to be a proper and applicable technique to achieve the research purpose.

The research sample is purposive and designed using the convenience sampling method. Traditionally, the sample used in qualitative research is smaller than in quantitative studies. The use of purposive convenience sampling strategy is recommended in order to obtain more useful, in-depth information fulfilling the research purpose and to avoid the data surplus (Miles and Huberman, 1994). During the research, 20 participants of online communities projects (respondents are marked by letter "P" and a number) and 10 project initiators who use/can use the added-value of such projects (respondents marked by letter "I" and a number) were interviewed. The projects under the investigation operate in Lithuania. The respondents were selected after the consideration of data gathered during the experiment phase of the research and analysis of present and/or potential recipients of the added value. In the processes of designing respondents" list, it was necessary to ensure representation of all respondent groups. This was essential in order to observe the research phenomenon from different perspectives, to compare differing opinions on Collective Intelligence emergence and to evaluate personal experiences of participation in such processes. First interviews are considered as pilot interviews, which contributed to the optimization and amendment of the research questionnaire. The results of these interviews and respondents" feedback led to the elimination of certain questions and emphasis of several aspects relevant to participants of online communities. Members of the research group contacted potential respondents by e-mail or directly. All respondents participated in the research on a voluntary basis and were not remunerated. The research participants confirmed their participation by signing the form of agreement (the form presented to participants – see Appendix 3; the form presented to initiators – see Appendix 4), which included information on the research purpose, process, expected results and responsibilities. The average length of the interview was 90 minutes; the conversations were recorded using digital voice recorders and transcribed.

4.4.1. The Instrument of Qualitative Research Data Collection

Dimensions and their definitions discussed in the theoretical part of the monograph were used to design questions of the empirical research instrument. The questionnaire comprises questions aimed at analysis of general situation in online communities (e.g., project title, aim, respondent's relation to the project and his/her demographic characteristics) and clusters of questions representing dimensions and processes related to the emergence of CI in the environment of an online community project presented below in Table 27.

Table 27. Justification of the research instrument questions

Dimensions and processes of the CI emergence potential in the environment of an online community project and their descriptions		
Independence	Possibility to act in a team; influencing factors; anonymous participation	How does such managerial feature of the project as the possibility to work in a team contribute to the project success? What has an influence? Can you choose anonymous or public participation? Does it have any influence?
Development of new ideas, prototypes, competencies and activities	Ways of generating ideas; possible means of motivating; satisfaction with the activity	How are generated ideas selected? How are ideas filtered (is there a formal/informal procedure)? How are ideas classified? Who classifies them and in what way? How are different groups and strata involved, how are they motivated? What means of motivation could be used? What would help to involve more participants? Are you satisfied with the way activities/ processes occur? Is everything developing as expected?
Diversity in the source of ideas	Group diversity	How useful is group diversity of an online community project?
Dynamism, openness and flexibility	Observation of actions of others; frequency of communication; possibility to act irrespective from time and place	Is there a possibility to observe what others are doing? Is there an online visibility option? How often do you communicate in a project? What influence does the activity of other group members have on participants? How do managerial features of the project (e.g., possibility to act at any time convenient for the participant, no time limits) contribute to project success?

Knowledge aggregation, knowledge transmission and fusion	Part of implemented ideas; implementation of ideas	Were the generated ideas implemented? In your opinion, what are the reasons of their implementation/non-implementation? Mention the stories of success and explain why they were successful. How many generated ideas (what part) were implemented? What are the reasons of their implementation/ non-implementation? Respondents were asked to mention the stories of success and explain why they were successful.
Decision-making and problem-solving	Decisions about activity; solutions	Who decides project aims/activities/functions? Are decisions made in a group of participants?
"Critical mass" of contributors within community to reach "swarm effect"	Managing big numbers of participants	If the number of participants increased, would it be necessary to filter, classify, etc. the ideas? Is the number of remaining participants relevant to you?
Knowledge dissemination and exchange	Project vitality	How is the aim achievement measured? Who assesses the influence? Have you ever tried to measure the impact? How actively would you like to contribute to the achievement of organisation/project aims? How is the number of ideas (proposed/ developed/implemented) measured? How many generated ideas signal project success?
Adaptivity	Sensitivity to change; development possibilities	Are there any plans to change something? If not, why? Do you have your internal criteria according to which you choose possible initiatives? How different social problems are incorporated in communities" activities? Are certain subjects limited? Can all social challenges requiring a solution be proposed?
Self-organisation	Leadership; hierarchical structure and relations; managing conflict situations	Are there any leaders and what are their functions? How is group leaders" contribution assessed? How important is the number of the remaining active participants? What about hierarchical relations? Are there any? What hierarchical structure could be ideal?

		What is the size of the group? What people participate (i.e., their experience, age, education)? Have they participated in any other projects/communities? What is the geographical distribution of participants? How could a conflict situation be resolved (e.g., blocking)? Who should do that? What is done in the case of the confronting and harmful member activity?
Social maturity	Recognition in the society, publicity; project results in real life; participants" values; scope of social problems	How are different social problems incorporated in communities" activities? Are you interested in social criteria published on the community website? Are such criteria announced publicly? Which social challenges do project initiators think they are solving? Is it important to you what sources of financing projects receive? How much are project initiators dependent on those sources of financing? What values do other project participants communicate?

Source: developed by the authors, 2014

The participants of online community projects and their initiators were given different forms of questionnaires. This was done due to more limited knowledge of project participants of the processes that occur on the platforms and on technological solutions than of their creators. The questionnaire for the participants of online communities can be found in Appendix 5. The questionnaire for project initiators is presented in Appendix 6.

4.4.2. Methods of Qualitative Data Analysis

Research data analysis is conducted based on the strategy proposed by Creswell (2008): (1) idea generation and description; (2) preparation of data for analysis, creation of a system; (3) categorization and theme identification; (4) identification of links and relations between categories. Content analysis aimed at linking hypotheses raised during literature analysis with the data, their categories and contexts obtained during the qualitative research. In order to increase the level of accuracy, obtain more details and standardize the working conditions of researchers interpreting

records, data analysis software Atlas and Nvivo were used. Provided below is a detailed explanation of each process step.

(1) During the stage of *idea generation and description,* every interview was read more than once in order to identify the main circumstances and aspects expressed by the respondents themselves. During this process, notes and comments were written down and used later in the subsequent research stages.

(2) *Preparation of data for analysis, creation of a system*. During this stage, the data were prepared for further analysis. The ideas aimed at defining the general picture and distinguishing important details were generated based on the respondents" answers. Interviews were sorted according to the generated ideas. In order to comprehend the data and systematize the information, the corresponding parts of texts were put into the table which summarizes all the cases (Cassell and Symon, 2004; Miles and Huberman, 1994).

(3) *Categorization and theme identification*. Comparison of the data in the table based on similarities and differences of the aspects discussed by the respondents led to the identification of reoccurring themes and categories. This is considered categorization or variable-oriented part of analysis (Miles and Huberman, 1994; Bitinas et al., 2008). During this stage, all the data were divided into smaller fragments, similarities and conceptual structures were explored and less attention was paid to the sequence and relations. Qualitative content analysis of the interviews was conducted.

Qualitative content analysis contrary to classic (quantitative) analysis distinguishes qualitative, not quantitative, aspects of the text (Berg, 2007). The basis of analysis is the interpretation of information expressed in the form of the text. Openly and directly expressed meaning in the text is defined as *manifest content*. The method of manifest content analysis enables categorization based on the text (words) describing objects. The meaning, which is understood indirectly and can be found deeper, is defined as latent (hidden) content (Bitinas et al., 2008). Interpretative analysis of latent content enables to interpret descriptions, understand the meaning of the text and discover new meanings read between the lines or not accurately expressed while speaking. Using the analysis mentioned above, the themes and sub-themes expressed in the data were distinguished.

(4) During the stage of *categorization and theme identification*, the relations between constructs and the processes occurring in the researched situation were identified. Miles and Huberman (1994) define this stage as the "process" or "contextual" analysis, the essence of which is to establish the sequence and relations between the identified categories. While conducting qualitative analysis, interpretative analysis of content and its "contextual" analysis, some supplementing strategies were used, including abstraction, deduction, contextualization and numbering. The similarities and differences between the discovered relations and variables were highlighted while distinguishing extreme, non-typical cases and linking, integrating cases that are close in their content relation. The relation was explained and interpreted by comparing it with research insights.

Internal validity of the research is based on several methods. Firstly, in order to check how well the respondents understand the questions/terms/terminology used and to specify the sequence of the questions, pilot interviews were conducted. In addition, the member checking was implemented (Creswell, 2007), i.e., feedback aimed at finding out the participants" opinion about the compliance of data interpretation was obtained: during the data analysis procedure, five respondents were contacted and asked to name and interpret the facts and circumstances they have mentioned. In most cases, the respondent's opinion coincided with the researcher's opinion. Furthermore, crosschecking was conducted. In each stage of data analysis, results were checked by the research project co-authors. Having taken into consideration opinion differences that appeared during the discussions and seeking for objectivity of results, themes that were not completely clearly described were updated by supplementing them with textual illustrations, citations, also the titles of some themes were changed, etc.

One more indicator improving the research quality is external validity. It shows that the research conclusions can be generalized and attributed to the entire population. Statistical generalization is not important in qualitative research; therefore, Lincoln and Guba (1994) offer to use the term of *transferability* instead of external validity which is more suitable for quantitative research. One of the strategies ensuring research transferability is a *thick description* of the research (Creswell, 2007; Bitinas et al., 2008). It is defined as a comprehensive description of the research process, detailed

description of the research object, methods, procedures, researcher's role and other circumstances. In order to increase transferability, a detailed description of research organisation and realization is presented. Another feature of the research quality is *reliability* or *dependability*. According to Bitinas et al. (2008), reliability of qualitative research can be increased by ensuring data stability, repetitiveness. Reliability of the research was increased by involving several researchers in data categorization processes. In order to ensure data stability and maximize research reliability, a structured questionnaire, including open-ended questions, was used, which increases the sequence of descriptions, and the similarity between the aspects of the context and situation.

4.4.3. Qualitative Research Results and Insights

Qualitative research aimed at establishing similarities, differences and relations between the interview text segments. In the process of content analysis, nine themes and categories reflecting the potential of online project factors were established: motivation of participants/groups, diversity of participants/groups, dynamics of participants/groups, the influence of time and place, methods of idea generation, the size of a group/critical mass, anonymity/publicity decisions, strategic decision-making and self-organisation. The established themes and categories of qualitative research are presented in Figure 44 below.

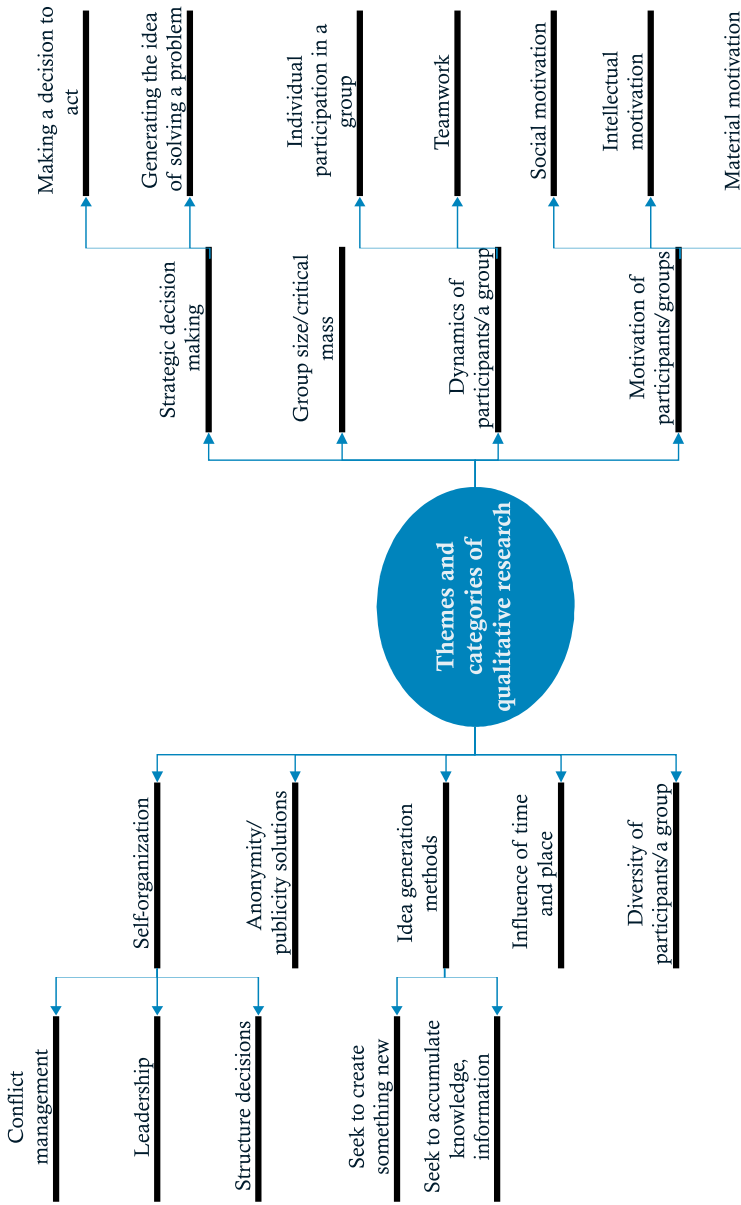

Figure 44. Themes and categories of qualitative research

Source: designed by the authors

Further, comprehensive analysis of the established categories is presented together with a detailed discussion on identified sub-categories. The conducted content analysis of the research data and the research conclusions are illustrated by participants" citations presented in the footnotes.

4.4.3.1. Motivation of Participants/Groups

The analysis of the research data revealed three types of participant motivation in online communities, including material, intellectual and social. Material motivation is linked with tangible measures providing financial and material benefits, such as journeys, gifts and financial incentives[89,90]. Intellectual motivation is closely related to the attractive content, relevant information[91] and potential of intellectual interaction[92,93]. The research participants discussed cases of social motivation most frequently. Such cases contain social communication, group communication[94], social recognition and possibilities of self-realization[95,96].

The research data confirmed the conclusions made in Malone et al. (2010) study to a great extent, i.e., in most online communities love and fame are the main motives determining one's decision to participate.

[89] "Motivated by the journey which we had. It was absolutely perfect, everything was very generously paid. That journey was surely very good for me" (P3).

[90] "There are two things: fees and there is a non-fee, there are points. You collect points that can be later converted into something, i.e., then they can invite you. Your importance is growing. There can be non-fee projects, but they can later significantly influence an invitation to high fee projects" (I5).

[91] "Motivation of participation is getting information. People who discuss things even give advice, because they have lived through similar situations" (P16).

[92] "As I have mentioned, legal psychological consultation. Additional services. Everybody must be motivated, because the major part of information is under one roof" (I3).

[93] "The main motivation to be a member of the association and at the same time a user of that virtual system is knowledge exchange, acquaintances, communication, getting new contacts, exchanging information about tools, measures, resources to carry out that marketing activity" (P19).

[94] "There is no wish to leave the contacts that were made, opinions are being exchanged, it often becomes something like a habit. At some moment to have a look at what is being written on the webpage, what discussions are going on. Very high motivation is not necessary to stay once you are a member" (P13).

[95] "Professionals who are attracted to projects are motivated by the possibility to implement original creative non-commercial ideas, by providing materials and quite a lot of creative freedom (ideal conditions for a professional's portfolio)" (P10).

[96] "This is oriented towards those people who want and have something to say" (I6).

The need of love and fame is satisfied by social motivation in online communities. Even though the means and conditions of intellectual and social motivation are in some cases defined as closely related concepts, in this research they are separated into benefits related to the assessment of contents (intellectual) and to benefits related to social communication (social). In research literature, it is commonly agreed that social motivation is the key tool used to involve participants in online communities (Deci and Ryan, 2008; Frey et al., 2011; Wang, 2014). This trend is based on the self-determination theory, according to which internal motivation depends on how much the main needs of autonomy, knowledge and connection are satisfied (Deci and Ryan, 2008). In this case, social motivation is related to the need of connection. According to the research results, the basis for it could be defined in two ways – *internal social relation* and *external social links. An internal social relation* is close to the need of connection and is based on the idea of altruism (Frey et al., 2011), aspiration to find friends with similar interests and a desire to belong to a community (Frey et al., 2011), etc. The research participants define belonging to a community as a motive stimulating to act and not to leave the online community[97], providing certain safety and confidence[98,99] and satisfying the need of communication[100]. The other type of social motivation in a community, *external social links,* is oriented towards the participant's aspiration to establish his/her status in the community. Establishing one's status is related to the desire to be socially recognized (Wasko and Faraj, 2005), evaluated by other members and in other communities (Leimeister et al., 2009) and to career possibilities (Frey et al., 2011). The analysis of the research data leads to the conclusion that this particular type of social

[97] "There is no desire to leave the contacts that were made, opinions are being exchanged, it often becomes something like a habit. At some moment to have a look at what is being written on the webpage, what discussions are going on. Very high motivation is not necessary to stay once you are a member" (P13).

[98] "Every question is not promoted or supported somehow separately, but always, because the group of participants is wide, so in most cases the like-minded appear" (P18).

[99] "(...) symbolic capital of the group, visibility of activities, a possibility to gain experience, develop creative activities" (P10).

[100] "(...) simply to be in the company of the like-minded, to participate in entertaining events sometimes (...)" (P19).

motivation is mentioned most frequently and is assessed as dominating by the research participants[101,102,103,104].

Financial benefits satisfied by material motivation are also mentioned by the research participants but less frequently. According to Calder and Satw (1975), it is one of the most suitable means to motivate a group. In contrast, there prevails an opinion that financial incentives are effective for a short-term period (Osterloh and Frey, 2000). Intellectual motivation can be only indirectly related to the aspect of financial benefit due to a potential benefit of contents for participants, i.e., participants may seek to indirectly gain some experience through the capabilities of other participants and use it for the foreseen purpose in their own activities[105,106]. Frey et al. (2011) attribute financial benefit to external motives which are closely related to the needs of career, maintaining one's status and recognition. However, in the present research, the latter are attributed to social motives.

The analysis of intellectual motivation cases leads to the conclusion that this type of motivation can be related to the need of autonomy which covers satisfaction (Frey et al., 2011), control of one's activity (Von Hippel and von Krogh, 2003), the possibility to express individual creativity (Roberts et al., 2006), self-expression (Malone et al., 2009) as well as learning or various competencies development (Leimeister et al., 2009). The research data revealed such participation motives in online communities as the need to express one's creativity[107,108],

[101] "This would be not a bad motivation for other people to actively communicate with others, offer something. Simply to set a definite area for which one would be responsible" (P2).

[102] "To have that reputation is important for some <people>. Perhaps this motivates, you can see that it is important for others. You can feel somewhat important" (P1).

[103] "Seeking leadership, competitiveness, because there are many people who want to be visible, to establish some status. There are some people who work in line with their beliefs, but at the same time there is that big desire of competitiveness, leadership" (D6).

[104] "If you write something important, others press and you accumulate some kind of pluses. The pluses mean that others can see that you are reliable and have recommendations" (P1).

[105] "Everybody must be motivated because the major part of information is under one roof" (I3).

[106] "(...) the main motive to be a group member is the possibility to use resources, have access to those resources, get information and share information according to a need" (I10).

[107] "(...) it was offered to a club member, who is interested in dog obedience training very much, to follow, take care of this section (…) not bad motivation for other people to actively communicate with others, to offer something" (P2).

[108] "Professionals who are attracted to projects are motivated by the possibility to implement original creative non-commercial ideas, by providing materials and quite a lot of creative freedom" (P10).

to learn[109] and the need to voluntarily share possibilities of realization[110].

4.4.3.2. Diversity of Participants/Groups

Group diversity defines participants" demographic, educational and cultural differences. Using the analyses of mathematical modelling and case studies, Page (2007) proved that diversity creates not only superior groups, but also enterprises, schools or societies. The sources of new ideas and knowledge can be found by attracting new members into online communities. The assumption that group decisions are more accurate than individual ones due to the involvement of diverse opinions and approaches was empirically confirmed by Wise et al. (2010), Hong and Page (2004) and Krausse et al. (2011). In the long run, group variety, abundance of talents and the level of participant involvement determine the quality of the community activity results and its continuity (Bonabeau, 2009) as well as encourage to take better decisions[111,112,113,114,115,116,117,118]. The analysis revealed that the majority of the respondents notice a positive influence of diversity. According to the research data, diversity fosters

[109] "As I have mentioned, legal psychological consultation. Additional services. Everybody must be motivated, because the major part of information is under one roof" (I3).

[110] "Or simply to transfer part of experience to a younger generation" (P19).

[111] "Our activity is quite wide and different, so those different people help a lot. Let's say cases involving cruel behaviour can be taken and are usually taken by people who are older and have much experience and perhaps more patience, and these with projects-events, the youth have more enthusiasm" (I1).

[112] "Diversity is necessary to find better solutions perhaps, you'll exchange experience" (I10).

[113] "Diversity presents more various information, presents various information to every participant. It is possible to look at the same situation from different angles, to see" (P16).

[114] "It is useful perhaps, because one can debate and discuss issues of a various scope. In this area in general it is important to have education which is both technological and managerial, and not only researchers, managers or representatives of public sector" (P5).

[115] "(...) it is also important to involve psychologists, psychiatrists, medical doctors. Such a composition, such diversity is good" (P1).

[116] "As initiatives developed by the groups are addressed to the city residents and are implemented in public places, openness to diversity is the principle thing" (P10).

[117] "Group diversity really creates pluses, because you get to know a lot of new <things>, and this is good from the perspective of broadening one's horizon" (I7).

[118] "It is useful simply because it is looking at one and the same project, at some things in a different way, from a different angle, and every person brings his/her know how which is adapted, because some people are professionals, experts in their field and the contribution to this entire project is large enough" (I9).

the processes occurring within the community and helps to find better solutions. However, the respondents mentioned a number of problems caused by the diversity of participants, i.e., interruptions of discussions[119], difficulty in finding common grounds[120], distorted competitiveness among participants[121], difficulty in finding a consensus[122], generation/age differences[123] and complicated coordination[124].

4.4.3.3. Dynamics of Participants/Groups

As the result of the research, two sub-categories have been distinguished within the category of group dynamics: teamwork and individual participation in a group. The analysis of the research data revealed the following aspects characteristic of teamwork: virtual accessibility, non-virtual relation, anonymity, and team management.

Virtual accessibility is related to the possibilities provided by social technologies and the Internet. Social technologies enable their users to join and create new virtual and dynamic relations. Attracting participants who live in different countries[125] and acting in different media is one of the important results of virtual accessibility[126]. Virtual accessibility is also related to a more effective time management of

[119] "(...) sometimes in the context of discussions different mentality hinders certain things, but on the whole group diversity is only a plus, not a minus" (P18).

[120] "To my belief, because it is difficult to find things that are in common" (P19).

[121] "However, different challenges and problems emerge alongside diversity, because, let's say, about 4-5 years ago everybody lived in peace and quiet, I think that about 3 years ago conflicts, rivalry and verbal conflicts appeared. All conflicts and all the rest arise because of competition" (P6).

[122] "Group diversity also creates a lot of minuses, because every group does something in a completely different way and imagines that it is the only right way to do it" (I7).

[123] "I'm always for diversity. But it sometimes happens that I really face the problem that volunteers do not speak a common language when one and the same issue is discussed by a 20 year-old man and a 60 year-old woman, perhaps it is normal when that opinion (...)" (I1).

[124] "As to minuses – it is more complicated to coordinate when people have different aspirations, although sometimes it is complicated to organise in a narrow field, too, when people are different" (P2).

[125] "The main body is here, in Vilnius or Kaunas (…) But often it is in Vilnius. Then there is London and Washington" (I2).

[126] "We need different resources as a help while organising events, implementing some projects, looking for speakers, assistants, designers, volunteers, and the possibility to disseminate this information within the group, to use the group's external links is very important while solving such issues" (I10).

decision-making[127,128]. The research data disclosed advantages of virtual accessibility and confirm statements by Woolley et al. (2010) and Leimester (2010) that groups communicating online can solve problems more efficiently than unconnected individuals or organizations. The feature which was established during the research can be related to the so-called social communication based on social technologies (Preece and Shneiderman, 2009) which enables to implement a variety of activities and solve different tasks[129,130].

It should be noted that even though virtual accessibility is mentioned as an important feature of the online community project in terms of team work, part of the respondents stresses the importance of *non-virtual communication* occurring alongside virtual accessibility[131,132]. In the analysis of group work dynamics, the aspect of *anonymous* participation in a team should be mentioned. Part of the research participants expressed the opinion that anonymity stimulates a more active and open group cooperation[133]. Literature review revealed that in order to eliminate negative social, psychological or other subjective impacts on group participants, it is necessary to provide means to participate anonymously (Norvaišas et al., 2011).

The issue of team management is relevant in a discussion on teamwork in a virtual environment. Lorenz et al. (2011) state that any social influence

[127] "The accessibility that one can reach all volunteers in a fast way, all volunteers in a fast way and at the same time, saves a lot, a lot of time, because you can imagine that if I had to communicate with each of them on a concrete topic separately, it would be drastically complicated" (I1).

[128] "If there is an idea which needs a team and it is announced and it is said that people's help is necessary, we'll say that this possibility to call in a team instantaneously is a convenient, time saving thing" (P8).

[129] "'Brainstorming" is continuously going on, the result is really good" (P2).

[130] "Team work is situative, most of our activities under implementation require at least two people. The possibility to create a team for an activity directly adds to success" (P10).

[131] "It is difficult to achieve something without live communication. Perhaps part of that community has to be only virtual, but some kind of a kernel meets in reality" (I4).

[132] "Do they help to solve the problem of real communication? No, they don't. They are very specific, i.e., all questions have to be more of informative type or where it is not necessary to discuss, argue a lot, where everybody could just quickly agree and move on" (I7).

[133] "In that anonymous team you know that that can serve as a hint for you to disclose some of your knowledge, experience. If someone presented solution 1 and it created some associations for you where you can present another solution, just not presenting it, so, the feature of an anonymous team is that what it awakens" (I5).

can diminish the quality of a collective solution. In such an instance, team management is closely associated with hierarchy-related social and psychological problems. On the other hand, research participants indicated team management as a necessity when managing large groups of people in order to preserve principles valuable to a community, i.e., transparency, ethics, etc.[134,135]. Group management solutions are also relevant while unravelling the tendency when the opinion of previous participants of the community can have an influence on the opinion of those who joined later (Malone, 2009). While analysing the data of the present research, a trend of individual, isolated participation was observed when joining online community in later stages[136].

Quite a big number of the respondents underline *individual participation* in a virtual community project[137,138,139]. Individual participation in this research corresponds to the characteristics of the Collective Intelligence system proposed by Lykourentzou (2011) as the individual activities with the task to receive benefit from participation in the system[140]. It is stated that in order to create a high quality CI results in the system, the contribution of group participants has to be made individually and independently from each other (Malone et al., 2010).

[134] "(...) with the portal growth there emerged a big challenge of how to manage that big flow of discussions and remain perhaps ethical, as transparent as possible, due to this the need to have moderators in each and every group has arisen" (P18).

[135] "There are people who organise some activities, (...) there is quite a number of such teams, kernels; there are some overlapping ones. And also there are simply people who do the management" (P6).

[136] "(...) they make groups and visit each other leaving the boundaries of that website and meeting each other. I don't participate in such meetings, because I joined that website later when those gatherings had already existed. Well, I didn't have such a wish and a need to participate in such meetings" (P16).

[137] "(...) mostly writing articles, comments, and the like is such an individual thing, that's why sometimes there is too little team work. Individual concert is going on" (P11).

[138] "Team work? (...) In my case it is really not relevant. I could not comment this issue in detail" (P12).

[139] "Well, in principle, there in the team it does not really happen. Sometimes, yeah, you concentrate. Sometimes you make mistakes, somebody else shows yours mistakes or you attract somebody's attention at mistakes. Sometimes it happens that there are different solutions to a more interesting question. But not in a team, somebody solves them individually, gives to choose, to read. Once I was criticised because I was too much into theory, I got involved into a bit complicated solutions. One should act looking at the audience which is asking, so one should act in a simpler way" (P20).

[140] "Personally I agreed to do it because I wanted to write" (P3).

4.4.3.4. The Influence of Time and Place

As it has already been mentioned, the issue of time and place is one of the most easily resolvable in an online community. Due to social technologies and the Internet, the activity of such communities is unrestricted by these characteristics. Technologies enable more possibilities when compared to real time and offline community projects[141,142,143]. The analysis of the research participants" responses distinguished a dual definition of the time and place factors. Some participants stress their free time after work and express the opinion that participation in a project is their free time activity[144,145], whereas others compare participation in project activities to one's job[146,147]. According to the research participants, the virtual environment in which a project is implemented provides possibilities to ensure participants" mobility[148], contact immediacy[149,150] and dynamic group relations[151]. Time and place

[141] "Yes, the forum is accessible round the clock" (P15).

[142] "Yes, this is a very convenient thing when one can act at any time, can visit" (P16).

[143] "Useful information is presented on the webpage and it is accessible at convenient time. I think we would not have done the project which had certain hours" (I3).

[144] "There is more free time. There have been quite many discussions as to which time would be better to choose, nevertheless, the time after the working hours is being selected. Meetings are organised not earlier than half past six, it is usually in the evening. In order not to stop the main work" (P19).

[145] "There is more free time. It is a non-profit seeking organisation" (P7).

[146] "Since the majority of the people in the group are not from the private sector, but mainly from the non-governmental sector or the public sector where they are less blocked, they do it during their work time. It is work for quite a number of people" (P6).

[147] "Of course, that is becoming something between leisure and work for certain people, this does not generate money, but they treat it as a duty; here they are like pseudo leaders, because people feel that duty, that people treat it without remuneration" (P7).

[148] "Very comfortable. Changing a live meeting is significant. Also, that a person is moderating abroad, he is now living without his family, traveling every month, he has much time now" (P1).

[149] "Since usually everyone plays there while in Lithuania it is a night and the results appear in the morning, thus, if a person is active, it is interesting to him, he wants to comment something, so, most probably, he will be doing that during his work time. If he is interested in what is going on in Lithuania and in Europe, so the competition is in the evening, so then most probably it will be his leisure time. But again, it depends on the person. Basically, participation is not restricted anyhow in time and everyone can participate when it is convenient for him/her" (P13).

[150] "Very positively. If you have some idea, you can simply forget it while waiting for a meeting (…)" (P2).

[151] "Certainly, because the system is on the Internet and a person who has access to the Internet either via his computer or his telephone can freely communicate, finally,

solutions in an online community contribute to the reduction of costs, too[152].

4.4.3.5. Anonymity/Publicity Solutions

Literature review revealed the dual role of anonymity in online communities. The possibility to express oneself anonymously encourages creativity and independence from external influences while offering ideas. However, it can also cause problems to community managers due to the decreased potential of control. The research data confirm Goldie's (2006) statement that a person's data protection and anonymity ensures greater self-expression[153,154,155] due to the ability to make independent solutions. According to Norvaišas et al. (2011), in order to eliminate negative social, psychological or other subjective factors, it is necessary to ensure participants" anonymity in virtual space. Such decision guarantees elimination of opinions by authoritative group-members and allows equal attention to the ideas of all participants (Heylighen, 2013). However, it should be taken into consideration that anonymity allows participants to respect the norms of the group or social norms less (Sassenberg and Postmes, 2002). This research revealed that in the case of the analysed communities, participants can lose the sense of responsibility[156] or not respect generally accepted norms[157] if their real identity is not disclosed. The research participants also pointed out that anonymous participation is not acceptable in the activities of communities uniting professionals[158,159].

sometimes an idea or a question arises at the most unexpected time, not necessarily during the working hours, thus the virtual group provides the opportunity to record it and apply to colleagues who will respond perhaps not at once, perhaps only in the morning, but the initiative was yours" (P9).

[152] "Firstly, it reduces costs very much. The traditional way was to separate from the rest of the world for three days and to discuss. So all the virtual consortia, the so-called meetings, really mint those tasks and it has worked very well" (I7).

[153] "Some simply feel bolder to express themselves when they may not present their name" (I8).

[154] "(...) they are less afraid to express themselves" (I5).

[155] "I am stopped, because it might touch some concrete people. For example, I would like to write about certain things happening in the Government" (P3).

[156] "(...) when a person posts his opinion, votes, it is important to everybody to know who is voting for that. When responsibility is anonymous or collective, it is nobody's" (P9).

[157] "(...) when there is quite a big space of anonymity, it provokes some people to show themselves not in a good way" (P13).

[158] "(...) this is communication among professionals, publicity is perhaps even desirable" (P5).

[159] "(...) here it is you who wants to be recognised, because then you will be a very big expert in that subject" (I2).

It was also observed that the examined online communities choose different solutions related to participants" anonymity and publicity: participation using pseudonyms[160,161,162], exclusively anonymous participation[163,164], registered participation using undisclosed personal data[165,166,167,168], participation with a possibility to choose the level of data disclosure[169,170,171] and public participation[172,173,174,175,176,177]. Nonetheless, it should be mentioned that the majority of projects chose at least the minimal identification means in order to introduce a more effective participant control in respect to following rules and norms of ethics.

4.4.3.6. Methods of Idea Generation

While generalizing participant responses on their activities in an online community, it can be stated that such platforms provide a possibility to join

[160] "Everybody could choose any pseudonym they wanted" (P14).
[161] "Participants register using pseudonyms" (P7).
[162] "If one wants to comment, he has to enter his pseudonym" (I3).
[163] "Public participation is not possible (...) Anonymity on the platform itself is cornerstone" (I5).
[164] "Participation is anonymous, however, registration on that website includes presenting one's name, surname and the Internet address" (P16).
[165] "The profile itself that you have filled out, your information, you cannot regulate all invisibilities; whether they see it publicly, or whether only those who are linked, or those who have confirmed their identity" (I4).
[166] "No, there is no such a possibility to choose anonymity" (P19).
[167] "There is no anonymity with us (...) here it is you who wants to be recognised, because then you will be a very big expert in that subject" (I2).
[168] "It is only public, there is nothing like anonymous participation" (P9).
[169] "People are not forced to somehow register using their name, surname. Everyone can choose any user name" (D13).
[170] "One can read being not logged in, but if you want to write something, you have to log in, and in order to log in, you have to register there. To create a certain virtual account of your own (...) One can participate either using their own name or anonymously" (P20).
[171] "This is an individual matter, everybody has that of his own. If he does not want to write his name, surname or present other personal data, we do not forbid this" (P8).
[172] "We do not have anonymity here, I think that anonymity is necessary "for whistle blowing", but not for offering ideas or participation in a project" (I2).
[173] "There is no anonymity. As much as it was allowed, it appeared completely not allowed" (I6).
[174] "No. It is related to a financial operation. Anonymity is not possible" (I9).
[175] "There is only public, no anonymous participation exists. And of course, when a person posts his opinion, votes, it is important to everybody to know who is voting for that. When responsibility is anonymous or collective, it is nobody's" (P9).
[176] "No, there is no such a possibility to choose anonymity. If only to present an anonymous e-mail address. But usually it is always requested" (P19).
[177] "The name, surname is seen" (P1).

big groups of individuals in tackling creative tasks. It is in the communities like these that the social aspect of creativity enabling the growth of creative potential becomes apparent (Yu et al., 2012). Project initiators can raise different issues and expect creative, diverse and intellectually rich solutions.

During the research, both community participants and initiators were asked about the ways and methods used to generate ideas, communicate and solve problems. According to Yu et al. (2012), collective creativity is defined as collective acts or actions that depend on the task and the result of the foreseen collective action. In some cases, *accumulated knowledge, information* may be sought, in other cases – *creation of something new.* In research literature, knowledge accumulation is defined as creation of collections (Malone et al., 2010). The responses of the research participants show that the search for new solutions and ideas as well as collectively generated solutions to problems is not a frequent aspiration in Lithuanian online community projects. The creation of collections[178], information exchange[179] and knowledge accumulation[180] are mentioned more frequently.

The analysis of the data related to projects seeking *to accumulate and exchange information* led to the identification of different methods, i.e., simple exchange of information[181], discussion[182]. Non-virtual methods, including workshops[183] and meetings[184,185], were also mentioned. This type

[178] "(...) it is just presenting information. Accumulating information, presenting (...) the system is alive, because it simply accumulates information and the most important things, that is, events and occasions, advertisements, and material is presented" (P19).

[179] "As this portal is basically both for discussions and presenting ideas and opinions, here most likely presenting ideas would be that "key success factor", and those who have chosen such an aim, thus, I think that those who were creating this portal and, in this sense, they had such an aim. So that to communicate and exchange experience" (P18).

[180] "Firstly sharing new results, reports, laws; the other thing is, there was a case when a person wrote a pure literary review article and sent the list of references for evaluation. So, I think <it> is used for the analysis of research ideas, for generating. Sometimes for practice" (P5).

[181] "The most important is presenting ideas, because all the rest on the webpage is news, messages about basketball" (P13).

[182] "Somehow such a discussion is going on. Somehow, so that somebody structures ideas, no. We simply structure strong, weak aspects. The purpose is to collect information" (P1).

[183] "Another way is "the workshops" mentioned before. When there is already a certain problem, then a creative discussion is organised, a face-to-face meeting is held at a separate time. Then there are, of course, seminars and trainings during which straight in the process of teaching there are formats to generate those things" (P19).

[184] "But to encourage them somehow to create in that virtual space is quite difficult, therefore, then I am trying to meet people "in live" for such a process" (I6).

[185] "(...) it will again be an offline mode, so that we close everybody for the weekend and will try to do something" (P7).

of communication can be defined as interaction in communities of practice (Lesser et al., 2012) which usually are used to share experience[186] and for active communication[187]. A large number of respondents could not identify a clear method of idea generation. In the interviews where the respondents discuss creation of new knowledge and decision-making, brainstorming[188] and voting[189,190,191] were mentioned. To generalize, in projects of online communities, voting is one of the most common methods used in the creation of new knowledge and solutions. The methods of using games, contests or collaborative market techniques to generate knowledge were not mentioned. This can be related to the characteristic features of the analysed projects. It is stated that contests, competitions are used more frequently and successfully in solving open-ended questions and creating innovations (Lesser et al., 2012). Summing up the analysis of the communities in question, most of them can be defined as projects of social communication seeking incremental practical changes. Therefore, the creation of new knowledge is most frequently related to solving real-life problems[192,193,194,195].

[186] "The purpose is, I think, in that complicated situation to find the like-minded and exchange information" (P16).

[187] "Discussions are the most important" (P15).

[188] "By a several-stage brainstorming, until a clear concept is clarified and until technical aspects of the implementation of the idea are solved" (P10).

[189] "Voting is also quite important, because it involves people very much, particularly if a simple form of voting is created, not a complicated thing to do, simply while reading the news people can see a form of a survey nearby, can press a button; <it> helps to maintain such a relation, a possibility is created for people to engage in an activity" (P9).

[190] "Only by voting" (I3).

[191] "Vote, yes. Essentially, there are deliberations and voting there. The aims are essentially the same, what's to be done if it is more for voting" (I6).

[192] "Essentially, somebody presents an idea, a question, a problem, while others present an idea of how to solve it" (P20).

[193] "If it is related to decisions of a public institution, then it is another thing. This is a living process which we do not want to restrict by formal procedures. If there appear issues such asto appoint a director of a public institution or a question of signing an agreement, automatically there are safeguards how to involve those responsible people" (P8).

[194] "We are making efforts to be as open as possible and use virtual online communities for making optimal decisions and becoming our true assistants, and as I have already said, so that they could feel being part of the process, could feel owning the whole idea and its implementation" (I10).

[195] "The main is sharing information, then voting and solving current issues, while those that are not urgent, can be transferred to virtual space" (I5).

4.4.3.7. Strategic Decision-making

The generalization of interviews leads to the conclusion that most frequently projects of online communities are initiated with the aim to exchange information and to solve the arising problems, which covers making various decisions. In organisations and communities, making group decisions is a precondition ensuring effective results. Prior to the rise of online communities, such decisions were made while working in project groups, focus groups, etc. Social technologies developed during the recent decades enabled communities and organisations to make decisions in virtual networks. Leismester (2010) distinguishes two stages of the decision-making process: generating ideas/solutions and decision-making. The division between generating the idea of solving a problem and making a decision to act was identified during the research process. In this case, the activity of generating ideas is related to the involvement and participation of the whole group and all users[196]. In contrast, the final decision is most frequently made by a single person or a group of several people, e.g., project initiators[197], webpage administrators[198], a specially formed board[199]. Malone et al. (2010) also define two types of decision-making, i.e., group decisions and individual decisions. Both in literature (Malone et al., 2010) and the research results, diverse technological and process-related decisions[200, 201] were identified depending on who makes the final decision – a group or an individual. The conclusion is drawn that when decisions are related to the group activity (e.g., community of house

[196] "These are usually the decisions, if we called the decisions the majority opinion, that are made in a group. There is not a single person on the webpage who would decide, would read a discussion and would somehow generalise it by himself. Usually that common opinion is formed on the basis of the direction, the opinion which is supported by more people" (P13).

[197] "The initiator" (P1).

[198] "People who administer the webpage decide. Of course, users can express their ideas, but final decisions are in principle the prerogative of webpage community administrators" (P13).

[199] "The board" (P19).

[200] "Any member can do that. Can write a comment in Facebook, can write an e-mail, and can raise a question in a meeting. Then the idea is deliberated in the board" (P2).

[201] "People who administer the webpage decide. Of course, users can express their ideas, but the final decisions are in principle the prerogative of webpage community administrators. On the other hand, if a big number of users demanded a certain concrete thing, I do not think that it would be possible not to take it into consideration. A webpage without users would lose its meaning in a short time" (P13).

residents), the final decision is made by the group[202,203,204]. However, when the project is related to the aims raised by initiators of using the help of the society to solve relevant issues, the right to make a decision is maintained by the initiators[205, 206]. Such a tendency is related to the relevance of the solution to the group members. If group solutions are relevant to all community members, the right of decision is maintained by the whole group. In cases when a solution is relevant to project initiators (that or those solutions are the project aims), the founder of the project selects the most suitable solution from different alternatives generated by the group.

4.4.3.8. The Size of a Group/Critical Mass

Critical mass is defined as the minimal number of individuals, which ensures effective functioning of the system (Lykourentzou, 2011). It is stated that the differences between organizational intelligence and Collective Intelligence are related to the size of the group. Organizational intelligence is not characterized by the "swarm effect", therefore, the level of intellectual potential is not equal to the results of Collective Intelligence which results from massive interaction and participation (Luo et al., 2009). The more people participate, the more attempts and energy are accumulated in contents creation and development of knowledge. On the other hand, too many participants are linked to several complications. When a certain number is exceeded, the costs of a new member exceed his added value (Asvanund, Clay, Krishnan and Smith 2004; Jones, Ravid and Rafaeli, 2004; Luo et al., 2009; Ransbotham and Kane, 2011).

The analysis of interviews demonstrates that respondents stress the issue of quality and quantity when discussing the optimal number of participants in a community. Some considered the number of participants

[202] "The community, because I attribute all those pseudo leaders to the community. Because there is no surplus of those pseudo leaders" (P7).

[203] "I would say the house residents themselves" (P4).

[204] "In a group of participants. Leaders are a kind of advisory support and nobody makes any decisions" (P9).

[205] "There are certain leaders. The main postulates are argued about, but still there are leaders who are established in the public space behind it either from some earlier time or new leaders arise. In one or another way they have the decision-making authority" (P6).

[206] "At the moment I make decisions as I am the main project coordinator and its owner. As have already said we are trying to follow democratic principles, the principle of involvement, and take all opinions into consideration, until now it has worked" (I10).

as being not relevant to quality and stressed orientation towards the quality of generated contents[207], whereas others were actively in favor of increasing the number of project participants[208,209]. Most of them saw a relation between the number of participants in a community project and the quality of generated contents. The prevailing opinion was that the more individuals contribute to the creation of intelligence, the higher quality can be expected[210,211]. On the other hand, the majority of those who support the idea of a greater number of participants underline difficulties to attract as many participants as possible[212,213,214,215,216]. This

[207] "I think that it is not necessary to increase the number, not the quantity but the quality is more important. We have to focus so that every person was from the media as unique as possible. And not so that to even more increase that group or diversity. Because now they are still quite alike" (P3).

[208] "Well, for me it is important that people participate. I do not know the result" (P18).

[209] "If there were more, it would be easier to organise and to generate as well as to implement them" (P2).

[210] "I think yes. This determines quality of information posted on the website" (P12).

[211] "We wish the community did not really decrease, but only grew, and that its members, who although are not physically members of our community, would be active in the virtual community and would participate, because the value of the community is, of course, its quality and participants" activity on the one hand, and also the number of participants, so the bigger the number of quality participants, the more valuable the contents of the virtual community is" (I10).

[212] "We do not feel that we have found appropriate contents or measures to increase the group members" activity, but on the other hand, perhaps that activity is natural, optimal and it is not reasonable to artificially raise it. It would be complicated to say what our purpose this case is, let's say, about improving the present system. Perhaps our critical mass is too small to become, for instance, a system of job search, job offers, because anyway we are a closed group. Therefore, here perhaps it would be necessary to raise different aims that have not been formulated yet, I mean so that to analyse qualitative aspects more, perhaps to have longer discussions and to see the expressed opinions which would not disappear from the bottom of group corresponding, but would be seen above the functionality; at present we do not have it, but perhaps it would be a certain aspiration, according to the key words or relevance of the topic" (I10).

[213] "I expected that everything will be miraculously (…) I made a bet with a smart colleague that in a couple of weeks here will be at least a couple hundred of people, and, of course, I lost. But one hundred gathered in a week and then got stuck for long" (I4).

[214] "Of course, there are some nuances; we were expecting a more active participation" (P2).

[215] "The essence is that it is virtual, we did not succeed in igniting informal mutual communication (…) The number of participants, activeness, and quality of discussions. We do not have those discussions, anyway, we have created a certain virtual tool, but nothing is happening in it" (I2).

[216] "There is little. Not developed yet. It is not the first year that it exists, but still in the starting stage, does not gather critical mass of authors, and I myself don't have time to write so much as it would be necessary for it to boom" (I6).

leads to the conclusion that in most projects the issues of participant motivation are not solved or are solved ineffectively and, therefore, an adequate number of potential contributors in the creation of the product of collective online community project is not attracted.

4.4.3.9. Self-organisation

In this category, the interview data related to the structure, activities, assessment and organizational decisions of the online community project were analysed. The following themes dominating in the participants" thoughts were distinguished: structure decisions, leadership and conflict management.

The theme of structure decisions includes discussions on the established and dominating hierarchy, structural decisions and relations in the project. The research revealed that online community projects have either *horizontal* hierarchical structure or *vertical* hierarchical structure. These two hierarchy styles can be associated with the group types distinguished by Malone et al. (2012): the crowd and hierarchy. In this case, the *horizontal* structure would correspond to a group characterized by the features of the *crowd* where everyone in a big group can act independently without decisions or orders by a certain authority (Malone et al., 2012). Horizontal structure is characterized by flat relations and is based on the principles of democracy and equality[217,218]. In some cases, such a horizontal activity principle of an online project is considered to be an advantage and a necessary condition to attract participants[219,220]. Barahona et al. (2012) state that horizontal

[217] "They are more like horizontal, typical for an online community where, in principle, there are administrators, they manage more or less" (I10).

[218] "Perhaps there is no vertical there, there is the horizontal type. As I have mentioned, the so-called association assistant is responsible for disseminating information. Sometimes simply an e-mail comes from the director or from another person who is mentoring one or another project. If somebody is responsible for trainings or groups in which discussions are held and if let's say "workshops" are organised, then it comes from him. Another issue comes from another person. So, simply in a horizontal way either from one or from another. The vertical which should cross certain levels, such a vertical does not exist" (P19).

[219] "In an online community in particular, this is not an organizational structure, it is on a free-joining principle, thus hierarchical relations are not possible" (P8).

[220] "In no way can there be a leader, because taking somebody's opinion, perhaps a non-suitable one, would be psychological pressure" (I5).

communication networks are an exclusive feature of modern online communities creating user-generated contents. Similarly, in Dahlandar and O'Mahony's (2010) opinion, organisations generating Collective Intelligence and acting on the basis of the crowd principle have to be characterized by flat relationships centered on the principles of equality and self-organisation. On the other hand, a tendency is being observed that in equal horizontal relations non-formal leaders appear and start to dominate. This creates certain contradictions and "verticalization"[221,222].

The other cluster of projects can be defined as the community maintaining *vertical hierarchical relations*. Such a structure corresponds to the hierarchical group defined by Malone at al. (2012), in which a leader assigns tasks and controls other participants and their relations. Dahlandar and O'Mahony (2010) affirm that structures with elected or non-formally established leaders are necessary to coordinate the implementation of long-term tasks, resolve conflict situations as well as foster and maintain community policy. This is also in conformity with the opinion expressed by the research participants[223]. It should be noted that in such type of projects the issue of optimization of hierarchical relations is the key one. The research participants also defined some negative aspects of the vertical structure, i.e., the pressure of a dominating leader[224] (such opinions were not observed among participants of communities with horizontal relations), which can determine a low participant involvement and a low level of Collective Intelligence (Malone et al., 2012).

[221] "Like in a non-governmental <organisation> – everybody is equal, but there are some who are more equal, who are trying to impose a certain will of their own. Certain non-formal groups are forming" (P14).

[222] "Except those people who administer, supervise relations between all other members, formally it is quite horizontal, equal; as I have said, certain non-formal leaders appear. Those speeches have a certain bigger meaning, but this is only because they themselves have fought for that position. It is in principle determined by activity and it can change at any time" (P13).

[223] "For volunteers, those who want to contribute a little, for them the hierarchy is sometimes strict, and when you strictly say, well, not strictly, but simply say what he has to do, he then does it with pleasure, when you say "think of how to do it", then there is that freedom and parity, and then let everybody make an offer, and then you offer all on your own" (I2).

[224] "When there are administrators. There are some quite unfriendly administrators who start banning very often, threatening with some sort of sanctions. As for me personally, I don't like those who have formed a certain hierarchy, somebody who feels superior. There is lack of politeness. There is lack of the principle of equality. For me it is more relevant that they should not be like those pitons or crocodiles that eat others. There are some leaders who eat others. Such aggressive leadership. Overly aggressive leadership can harm it" (P6).

While analysing the data related to leadership aspect in online communities, two features characterizing the management style were established: *formalisation level* and *the structure of leaders.* A high level of formalisation is associated with the leader's locus, i.e., whether the leader has an officially defined position, is appointed by project initiators or is self-appointed[225,226,227]. On the other hand, a low level of formalisation prevails in projects where leaders emerge non-formally[228,229,230]. To sum up, several functions of leaders were identified, i.e., administrative[231,232], educational [233,234] and motivational[235]. Project leaders, who are engaged in administration procedures, organise, coordinate and moderate activities, perform technical maintenance, whereas educational function is related to the dissemination of expertise, consulting, sharing of knowledge and experience. Motivation is understood by the research participants as involvement of prominent

[225] "There are leaders who formally are social network administrators, or they have certain organisations that really function, or there are those who do not have some sort of formal, but they have their own opinion, or they have some status in the society" (P6).

[226] "I'm a leader. I have given the right to publish their works to them themselves, most frequently I publish them, but there are single cases when they themselves publish directly" (I6).

[227] "Perhaps we, me and my colleague who is responsible for communication, public relations, information, are the main people in the name of whom communication is going on, low information within the group" (I10).

[228] "Other non-formal leaders who observe everything, know more than ordinary participants, their opinion is more listened to" (P13).

[229] "There appeared strangers who keep order, and even if someone says certain populist things there, then they say: here it is not Delfi, go and talk nonsense in Facebook" (I4).

[230] "(...) there are those who don't have some formal, but they have their own opinion or have some status in the society" (P6).

[231] "Leaders are most frequently also administrators, <they> supervise order, upload unnecessary or incorrectly uploaded posts into appropriate themes, and create new themes from those that were not in line with the topic" (P15).

[232] "There are founders of that portal who take care of the portal. Because basically the portal itself is discussions on different topics, the owners of that portal themselves look for group moderators who would really observe discussions, as far as I know, in respect to the language, and, well, would take different preventive measures if they detect some incorrect information there. Or one can apply to them if, let's say, there is some trade there, so one can report to them about cases of cheating, and the like. This is group moderators" (P18).

[233] "Leaders are the regular core of the group. The function in respect to other members is to encourage developing one's creative initiatives, consulting, and comprehensive help while implementing the project" (P10).

[234] "Leaders don't even take leadership. They share their expertise, experience" (P1).

[235] "Of course, there are those leaders who are established in the society, and even though they act particularly seldom, their word is influential and has weight. Their functions are leadership of ideas, argument resolution" (P6).

individuals in projects, their participation in activities and contribution to the creation of a collective intellectual product[236].

The analysis of conflict-related situations leads to the conclusion that the majority of conflicts occurring in online communities are resolved by *an administrator* or *a moderator (the hierarchical principle)*[237]. In addition, situations where conflicts are solved by the group itself were established *(the principle of equality)*[238]. Most participants define a conflict situation as improper comments, remarks of personal character, use of improper, abusive language. In some cases, communication without being aware of the main discussion topic has also been identified. It should be mentioned that the research participants expressed different evaluations of behaviour which causes opposition. Some participants of communities identified criticism, expression of opposing views and the like as a natural communication results that should not be punishable[239,240].

4.4.3.10. Summary of Qualitative Research Results

Qualitative content analysis aimed at exploring similarities, differences and relations between interview segments and establishment of links between the hypotheses raised during the process of literature analysis and the research data (categories and contexts). It is important to note that qualitative content analysis is not a suitable method for confirming/dismissing hypothesis; therefore, they were analysed in the context of respondents" ideas, arguments and opinions in order to deepen the researchers" understanding of the analysed issues. Although the interview questionnaires were designed in

[236] "There are different organisations fighting for human rights, so there, of course, there are leaders who really are in the lead of the projects. They have more weight. People feel respect for what they are doing" (P7).

[237] "There is a moderator, there are forum rules of communication, there is a possibility to stop or supervise participants, and if the rules, order are violated, i.e. improper comments, improper statements, sanctions can be imposed, i.e. a temporary suspension, restriction of the right to comment, and finally – elimination from the online community" (P8).

[238] "In those discussions it happens that a word is said a bit harshly. But everything sorted out among them and that is it. But <such a thing as> spreading a virus, no, there is nothing like that" (P4).

[239] "Sometimes <they> react too sensibly, sometimes the fight between good and evil is presented. <They> Block and throw away. A stamp of "confrontational, harmful" is put too fast and too easily. A kind of a person's virtual reputation is being created" (P6).

[240] "However, if a person expresses his/her opinion emotionally, it is not a bad thing, and in such a case, I think, emotions could be also allowed in this place, because those emotions are provoked by medicines that are used" (P16).

accordance with the theoretical insights resulting from literature analysis, not all dimensions were reflected in the research. The respondents" answers to the questions analysing knowledge dissemination and exchange, adaptability, social maturity and technological dimensions were not sufficient enough. Therefore, it was difficult to categorize them and they did not disclose deeper insights, relations and links. This drawback can be considered as the research limitation, which will be resolved in further empirical research efforts by conducting deeper theoretical analysis and updating research instruments. Nonetheless, the research data were sufficient enough to establish nine themes and categories reflecting the potential of the online project, i.e., motivation of participants/groups, the diversity of participants/groups, dynamics of participants/groups, the influence of time and place, idea generation methods, the size of a group/critical mass, anonymity/publicity decisions, strategic decision-making and self-organisation.

It should be noted that prior to the analysis of the links between the research hypotheses and qualitative research categories, the results were insufficient to gain a deeper understanding of hypotheses H8 (*CI system has the potential for CI emergence when it demonstrates adaptivity to socio-cultural context*) and H10 (*CI system potential is related to the quality of technological solutions in the network*). In the case of hypothesis H8, interview participants" responses were not exhaustive enough, thus, they did not disclose deeper relations and links. H10 is related to technological decisions that are more thoroughly analysed in the conducted experiment.

While analysing hypothesis H1 (*CI system has the potential for CI emergence when the system is open, dynamic and flexible*), the element of *dynamics of participants/groups* is important. The research resulted in the identification of the following aspects influencing teamwork: virtual accessibility, non-virtual relation, anonymity and team management. Adequate use of these elements in satisfying the needs of different online communities with the support of the tools of social technologies and the Internet enables groups of people to gather and create new virtual relations as well as ensures dynamics in these relations. For a deeper understanding of the hypothesis, the element of *time and place* is also important. Tools of information technologies create possibilities for platforms to function without restricting these characteristics and ensure participants" mobility and dynamic relations. Qualitative data show that open, dynamic and flexible systems enable groups to solve problems that in reality are more difficult to solve by individuals or separate, unconnected organisations.

In the analysis of hypothesis H2 (*CI system has the potential for CI emergence when it demonstrates capacity for creating collective knowledge*), the dimension of *idea generation methods* is important. Summing up the participants" responses about activities in online communities, it can be stated that the search of new decisions, ideas and collectively generated problem solutions is not a frequent aspiration in the analysed online community projects. The creation of collections, information exchange and storing knowledge are more frequently mentioned. This can be influenced by insufficient technological decisions and a scarce number of participants, which does not ensure the critical mass effect.

The element of *anonymity/publicity solutions* distinguished during the qualitative research is relevant while seeking to expand the understanding of hypotheses H3 (*CI system has the potential for CI emergence when it demonstrates capacity for independent decision-making and collective problem-solving) and H6 (CI system has the potential for CI emergence when it offers security and privacy in the network*). The interview data lead to the observation that the researched online communities choose different solutions of participants" anonymity and publicity. This is determined by the dual role of virtual anonymity – independence from external influences fosters creativity, and at the same time it can diminish the possibilities to control the group. The number of socially-oriented online projects is growing in Lithuania. It shows the increased desire of citizens to participate in public debates on relevant issues and to search for innovative solutions. Nevertheless, the qualitative research revealed that one of the main advantages of the virtual space – anonymous participation – is not used to the full because on most platforms such participation is not possible.

To understand hypothesis H4 (*CI system has the potential for CI emergence when it demonstrates competencies for transparent self-organisation*) more comprehensively, the element of *self-organisation* is significant. The analysis of data allowed defining three groups of decisions that are relevant for transparent and effective project self-organisation: structure decisions, leadership solutions and conflict management. Responses on group structure included debates on the established hierarchy in the community, i.e., horizontal and vertical hierarchical structures and their elements. In the analysis of the interview data on the leadership aspects in online communities, the level of formalisation and the structure of leaders are stressed. The investigation of the material related to conflict situations

leads to the conclusion that conflicts are solved either by the hierarchical principle or the principle of equality.

When analysing hypothesis H5 (*CI system has the potential for CI emergence when the system has the capability to attract critical mass of contributors*), the most relevant element was the *size of the group/critical mass*. The respondents" thoughts related to the optimal group size centered on the discussion about the issues of quality and quantity. Qualitative analysis leads to the conclusion that in many online communities the issues of participant motivation are not solved effectively, which results in collecting an insufficient number of competent participants who can contribute to the creation of collective products of high quality.

In order to deeper understand hypothesis H7 (*CI system has the potential for CI emergence when it demonstrates a balance between the task of the community and participants*), the relevant element of *strategic decision-making* was identified. In organisations and communities, collective decision process is a prerequisite ensuring effective group activity. While analyzing the data, the division between generating the ideas/solutions and decision-making was identified. A tendency is observed that activities of generating ideas are related to the involvement and participation of the whole group, whereas the activities of making the final decision (such as setting the group aims) are more frequently conducted by a responsible person or a group of them.

In order to deeper understand hypothesis H9 (*CI system has the potential for CI emergence when the motivating factors are correctly identified and appropriate mechanisms to motivate the users created*), the element of *participants/group motivation* is valuable. While analysing the research data, three types of participant motivation in an online community were defined: material, intellectual and social. Cases of social motivation were discussed most frequently by the research participants underlining the significance of social communication, communication in a group, social recognition and self-realization possibilities.

The insights of qualitative research confirm the aspects discussed in scientific literature, such as the importance of social motivation in online projects, controversial influence of participants" diversity and anonymity, the group work enabled by social technologies irrespective of time and place, and complement these theoretical insights with new notional elements. Qualitative content analysis of the interviews allowed deepening the understanding of the defined hypotheses and specified a further direction of theoretical and empirical research.

5. MANAGERIAL AND ORGANISATIONAL MEASURES FOR FOSTERING COLLECTIVE AWARENESS

The quantitative and qualitative research results prove the necessity to search for tools fostering civic engagement of the society and to provide advanced concepts and managerial, organisational and legal solutions for stimulation of the collective awareness in the networked society. The next chapter is introducing a new managerial tool developed by the authors of this monograph and based on scientific evidence. The application of new CI Monitoring methodology can contribute to increase possibilities for the emergence of CI by empowering future communities for creation the new forms of decision-making, self-regulation and self-governance, self-configuration of communities, etc.

5.1. Developing CI Monitoring Technique

Under the recent conditions for the society's Collective Intelligence to accrue and develop, the ability to assess the potential for Collective Intelligence acquired by specific social groups (within an individual community, region or a social group) becomes a natural challenge. Based on Internet technologies and networking, Collective Intelligence has a potential to become global, both, geographically and content-related, but it still has to be parameterized and credibly measured. The following chapter will introduce the methodology for measuring the Collective Intelligence Potential Index (CIPI Index) proposed to strengthen scientific evidence about the potential of online communities for developing Collective Intelligence (see chapter 3.1 for a methodological framework). The new methodology will create the framework for CI Monitoring Technique in virtual scientific environment and will be based on predefined questionnaire, automatic data collection and their algorithmic analysis (www.collective-intelligence.lt).

The next chapter discusses problems and challenges faced in the design of composite indices, measuring the social phenomena. The main problems concerning the construction of composite indices applied in

social phenomena are classified. Also, the dependence of coherence of composite indices on the used data and their structure is discussed in this chapter. It sets out the basic guidelines that can be developed in the future for econometric approaches applied to statistical modelling of social phenomena.

5.1.1. Methodological Background: Designing Evaluation Indices for Social Phenomena

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Scientific literature (Handbook on Constructing Composite Indicators, 2005; Saisana et al., 2005; Huggins, 2003; Wignaraja et al., 2004; IMD, 2004; Freudenberg, 2003) defines a (complex) index as an instrument for qualitative or quantitative assessment of a certain domain that is composed of individual sub-indicators and is used to compare various analysed subjects. In other words, such indexes are quantities, the values of which are determined by applying statistical methods and using statistical data and may, in their turn, be used as input data in the analysis of an observed phenomenon. The index method is typically used to incorporate separate statistical values that may be described using different scales and numeric characteristics into a certain measurement system. Typically, indexes are sensible, where phenomena depending on numerous variables (e.g., country, economy's or organization's competitiveness, market integration, development of knowledge society, etc.) that, due to complexity of the subject or structure of the phenomenon, may not be unambiguously described by a single index, are being assessed.

Indexes are aimed to give the estimated subject an accurate and, at the same time, exhaustive rating to correctly describe the general state of the subject. Applied in homogeneous streaks or in any other regular scale, indexes may indicate phenomenon's long term development trends or short term changes in a state or region and, subsequently, help adopt political, economic or other administrative decisions. For instance, Russia's central bank, instead of waiting until the end of the

year or four or six month term, already attempts to react to the ongoing situation, described by certain indexes, including exchange rate and official reserves, by adopting adequate monetary solutions. Also, indexes give an opportunity to assess not only changes in the value of indexes, but the impact of the indexes on the specific features of the scrutinized subject, as well. Application of indexes to evaluate social phenomena aims to qualitatively describe evolution of such phenomena within a certain territorial unit or any other category (e.g., a group of citizens chosen under certain criteria). Progressive organizations may use the values of and changes in the observed indexes to ground their decision-making (e.g., the conduct and investment strategies of actors of financial markets may depend upon trends in stock or security indexes, central bank's monetary solutions depend on the evolution of consumer price indexes, etc.). Indexes are also widely used in the management to plan and analyse implementation of the planned organizational activities and to measure the impact of individual factors upon the evolution of social phenomena (Lee and Yu, 2013).

5.1.1.1. Key Features of Indexes and Index Construction Phases

An index is a numeric value that expresses statistical relation between dimensions of the same phenomenon. Such numeric value is an instrument to analyse an observed phenomenon. In other words, an index is a derivative numeric value of an estimated subject or phenomenon that describes a general state of the estimated subject depending on intrinsic and extrinsic parameters. A composite index means that such index incorporates a system of individual indexes, the values of which are used depending on their importance to define a conclusive index (Handbook on Constructing Composite Indicators, Methodology and User Guide, 2008). Major advantages and drawbacks of the use of composite indexes may be found in a manual compiled by Saisana and Tarantola (2002). One of the key problems in construction of indexes of social phenomena is a frequent uncertainty of what exactly has to be measured by means of composite indexes. Such uncertainty constitutes an essential reason preconditioning complexity of the process of evaluation of social phenomena. On the other hand, application of composite indexes and interpretation of their values faces serious problems in other spheres, as well. For example, complexity

of rating competitiveness lies not only in diversity of index calculation techniques, but also in the absence of a generally acknowledged concept of competitiveness, its multidisciplinary, economic, social, political, geographical and cultural differences between the regions and abundance and diversity of affecting factors. Inclusion of each factor that may affect assessment results into the index calculation methodology has a direct impact on the accuracy of competitiveness evaluation (Bruneckienė and Činčikaitė, 2009).

According to Foa and Tanners" (2012) study, one of the most important tasks in construction of composite indexes is to decide what data shall be used. Also, construction of a composite index depends on whether the provided two or three components should correspond to the evolution of an observed phenomenon or more components are necessary to parameterize and characterize the phenomenon. In the latter case, a problem of accessibility to the necessary data is faced. The traditional index construction methodology incorporates three different levels of structural elements: dimensions, components and indicators (see Figure 45). Dimensions include the most important categories describing a social phenomenon. Each dimension is made of several unique components of interrelated concepts. Each component is composed of indicators that measure the greatest possible number of the key aspects of the component. The structure of a composite index explicitly illustrates how various indicators vary in individual dimensions. Therefore, the used data is in principle preserved and clearly disclosed in each individual dimension. On the other hand, even where values of an individual indicator differ for various estimated subjects, their accurate rating is not always possible (see De Muro et al., 2009). Descriptions of social phenomena are frequently grounded upon three-dimensional indexes (Resindex, 2013; Social Progress Index 2014 Methodological Report, 2014; Foa and Tanner, 2012; Human Development Index, 2014).

Social Progress Index				
Category	Dimension	Basic Human Needs	Foundations of Wellbeing	Opportunity
	Indicators	Nutrition and Basic Medical Care • Undemourishment • Depth of food deficit • Maternal mortality rate • Stilbirth rate • Child mortality rate • Deaths from Infectious diseases	Access to Basic Knowledge • Adult literacy rate • Primary school enrollment • Lower secondary school enrollment • Upper secondary school enrollment • Gender parity in secondary enrollment	Personal Rights • Political rights • Freedom of speech • Freedom of assembly/ association • Freedom of movement • Private property rights
	Indicators	Water and Sanitation • Access to piped water • Rural vs. urban access to improved water source • Access to improved sanitation facilities	Access to Information and Communications • Mobile telephone subscriptions • Internet users • Press Freedom Index	Personal Freedom and Choice • Freedom over life choices • Freedom of religion • Modern slavery, human trafficking and child marriage • Satisfied demand for contraception • Corruption
	Indicators	Shelter • Availability of affordable housing • Access to electricity • Quality of electricity supply • Indoor air pollution attributable deaths	Health and Wellness • Life expectancy • Non-communicable disease deaths between the ages of 30 and 70 • Obesity rate • Outdoor air pollution attributable deaths • Suicide rate	Tolerance and Inclusion • Women treated with respect • Tolerance for immigrants • Tolerance for homosexuals • Discrimination and violence against minorities • Religious tolerance • Community safety net
	Indicators	Personal Safety • Homicide rate • Level of violent crime • Perceived criminality • Political terror • Traffic deaths	Ecosystem Sustainability • Greenhouse gas emissions • Water withdrawals as a percent of resources • Biodiversity and habitat	Access to Advanced Education • Years of tertiary schooling • Women's average years in school • Inequality in the attainment of education • Number of globally ranked universities

Figure 45. Typical structure of a composite index

Source: Social Progress Index 2014 Methodological Report (2014)

To construct indicators, weighted averages are often used (Diener and Suh, 1997; Newey and Stoker, 1993), where leverage factors are determined by factorial analysis. Traditional index construction techniques are not applicable in factorial analysis and reflective modeling where the index includes various types of indicators weakly correlated with each other; therefore, such indicators are analyzed separately from each other (Van Beuningen and Schmeets, 2013).

Index quality depends not only on the chosen construction methodology, but on the index structure and accuracy of the used data, as well. Many researchers note that new methodological proposals on index calculation frequently remain only experimental (Booysen, 2002) and are never tested by other authors. Thus, index calculation methodology presented in scientific publications is frequently doubtful as verification of index accuracy as well as development and implementation of a new index calculation methodology takes a great deal of human resources. Nevertheless, calculation methodologies for many indexes are being improved (Noorbakhsh, 1998) or updated every year (Human Development Index, 2014). The logical (procedural) index construction scheme is described below (see Figure 46).

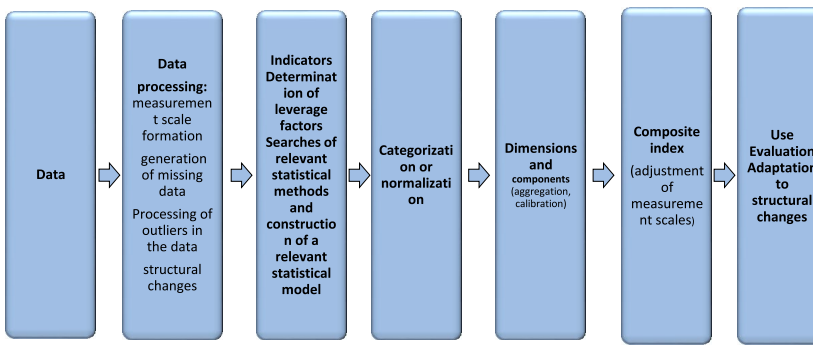

Figure 46. Logical (procedural) index construction scheme

Source: compiled by the authors

Data processing. Indexes constructed on the basis of statistical methods may depend on a range of different variables, the values of which are determined by the collected data. Generally speaking, data used to calculate indexes need no special processing because of the selected statistical methods and the nature of the obtained data. Before an indicator

is constructed, the principal nature of the collected data has to be explicitly analysed to allow drawing appropriate conclusions upon determination of the indicator values. Practical calculations frequently give no reason to draw valid conclusions since primary data have to be respectively structured. In some cases, for instance, aggregating or applying descriptive statistical methods, linear variation, grouping and tabulation, are enough to compare the data; in other cases, however, it is necessary to apply regressive, factorial or cluster analysis or other statistical methods. However, even indexes based on exhaustive statistical data are affected by indeterminacy preconditioned by certain factors that affect the choice of modelling methods. On the other hand, construction's composite indexes may be difficult to interpret due to the complexity of the data structure and statistical model.

An important index construction problem is accuracy of data and determination of the statistical significance of variables upon determination of index category and dimension. Statistical significance also known as relative importance is defined by leverage factors. Attribution of leverage factors to a corresponding variable that may be characterized as a response to an interviewer's question is defined in the model of the composite index. A considerable number of indicators constituting a composite index are combinations of responses to questions grouped in accordance with certain topics or other features. In estimations of the impact of interpreting (exogenous) variables on explanatory (endogenous) ones, researchers have distinguished four weighting types: an equal weighting scheme, weights ascribed to categories on theoretical grounds, a schematic system of weights and a system of variable weights (Foa and Tanner, 2012). Assessment of leverage factors is a complex process and it has to be acknowledged that expert evaluation entails a certain risk of subjectivity. To improve accuracy in statistical assessment of an observed process, a range of leverage factor ascription techniques are applied where:

- all factors are ascribed equal weighting coefficients;
- weighting coefficients are ascribed to factor groups;
- weighting coefficients are ascribed to factor subgroups;
- weighting coefficients are ascribed to all factors;

Leverage points define the place of an individual target within sample data where structural changes of the observed and assessed parameters may occur. Atypical values of a random variable have a greater leverage. Although they have no significant impact upon regression coefficients,

individual outliers affect the model quality comprising significance and tolerance levels. Statistical data are selected and process so that the impact of an individual indicator corresponded to sample data. In such case, the impact on a composite index value means an impact on exogenous variables and indicators, as well. One of the most frequently applied standards to measure the effect of data elements is Cook's distance:

$$D_i = \frac{\left(\widehat{\beta_{(i)}}-\widehat{\beta}\right)X\prime X\left(\widehat{\beta_{(i)}}-\widehat{\beta}\right)}{p\cdot MSE};$$

where X – a matrix of exogenous variables, β – regression coefficient vector, – parameter estimation vector, MSE – mean squared error, p – number of regression parameters.

There are many statistical procedures that allow identification of a proper weighting scheme. One of the most important among such methods is a principal component analysis that reduces multidimensionality and dispersion of the used data by means of a linear transformation and exclusion of the variables dispersions of which are small. However, according to Foa and Tanner (2012), this method is not widely applied to practically construct composite indexes partly because the leverage coefficients change over time and because application of PCA method essentially fails to qualitatively change model features or assessment results compared to the equal weighting scheme. Application of regression analysis also determines a range of ambiguous results due to latency of interpreting variables (Foa and Tanner, 2012).

Formation of measurement scales. Social research may be misleading if the used values are not properly measured (Bailey, 2008). Measurement scales are attributed measurement techniques to assess or measure a wide range of values (Diamantopoulos and Winklhofer, 2001). Qualitative data are measured by applying nominal or range measurement scales (McGranahan, 1995). A range scale is sometimes used to measure quantitative variable, as well. Interval and relative measurement scales are only used to measure quantitative attributes.

Generation of missing data. Insufficiency of data in a statistical analysis is a serious problem as such insufficiency may result in distorted and inaccurate results even where construction of indicators is statistically correct and reliable. The problem may be addressed not by developing the statistical model, but during preparation of data for statistical modeling

(Miller and Salkind, 2002). In such case, the missing data should not be substituted by extreme values of the observed variable as such values may significantly distort results.

On the other hand, part of data is often inevitably lost when problems are dealt with in practice. Traditional solutions are twofold: the missing values are either ignored or substituted by average or characteristic values of the specific variable. Such solutions, however, are exceptionally applicable when only few values are missing. Where a more significant part of data is missing, the aforementioned solutions may distort modeling results. To tackle the problem, researchers have proposed a procedure where the missing values are reproduced by neural networks or simulation techniques applied on data transformation (for more information, see Rubright et al., 2014).

Processing of outliers in the data. Diagnostic tests of statistical hypotheses provide opportunities to identify outliers in the data. In typical cases, attempts are made to identify standard deviations of random values that are outside the confidence interval of a certain confidence level of the normal distribution and assess whether samples and the general set (population) of such values include a meaningful number. However, such test alone is not always sufficient and prevents the final result from serious distortions. Such analysis may be supplemented by statistical tests describing statistical significance (effect) and leverage that give an opportunity to identify the scope of impact outliers of the variables have on individual indexes caused by inaccurate data or measurement errors. Such analysis helps to identify the part of the analysed data that has to be excluded before statistical methods may be applied.

Measurement of standard deviations. One of the ways to identify outliers is measurement of standard deviation. When a random value has a normal distribution, 99,7% of the values are within an interval of 3 standard deviations from the mean. Each variable is analysed separately with the aim to identify which values exceed 3 standard deviations from the mean. To make such identification, normally distributed random values have to be transformed into standard normal, i.e., standardized.

As random values are not always normally distributed, to identify significant deviations and extreme values, it is necessary, apart from graphic and quantile analysis, to conduct non-parametric standard deviation tests (based on Chebyshev's inequality, see Kubilius, 1996). On the other hand, presence of extreme values and significant deviations not

necessarily means that the data is inadequate. However, as extreme values are distributed atypically, i.e., outside the tails of the normal distribution, the tests identify their inadequacy to the normal distribution.

Identification of structural changes. An observed subject sometimes suffers crises, natural disasters or other extremes essentially affecting the conduct of the subject or phenomenon. The changes may be fairly credibly identified by applying special tests in the time lines of the corresponding indexes, the conduct of which is likely to be significantly affected by such crises. Such changes are called structural. However, there are frequent cases where structural changes are difficult to spot with the naked eye. Therefore, the problem of structural changes is usually addressed by applying special tests (see Andrews, 1993; Gur Ali et al., 1997).

Categorization and normalization. As indexes and indicators describe properties of analysed subjects by various values, it is necessary to adopt a correct assessment procedure granting an opportunity to accurately compare individual indexes with each other (Chakravarty, 2003). Therefore, to combine individual variables into a common index, the value of each indicator is normed (Caselli, 2008; Ray, 2008). Thus, an opportunity to compare the values of indexes of different entities of the same phenomenon and conduct a complex research is created. It is equally important to choose a relevant normalization method, applicable to the problem, in consideration of the method characteristics, indicator measurement units and indicators" immunity to possible data distortions (Ebert and Welsch, 2004). Various norming methods precondition variety in the resulting composite indicator. Application of different norming methods may cause the following problems:

- data normalization in accordance with the distance from the maximum element method may considerably affect the final result;
- when data are normed in accordance with the distance from the mean method, a strong deviation of a single variable from the mean of an individual index may considerably affect the final result.

Such problems are precluded when normalization is based on the methods of standard deviation from the mean and the distance from the minimum or maximum value.

Most frequently applied normalization methods are the following ones: standard deviation from the mean, distance from the minimum or maximum value and distance from the group leader or the mean. A less typical method

is the percentile method (Foa and Tanner, 2012). The percentile method incorporates percentile scales and univariate and bivariate percentile diagrams drawn to estimate indicators of the observed subject. When this method is applied, the values of the analyzed indicator are arranged into an ascending variation line, the line is divided into 100 intervals and the mean value in each interval is identified. The 50th percentile coincides with the median. The more significant index changes are revealed by the 3rd, 10th, 25th, 50th, 75th, 90th and 97th percentile. As indicator is being measured, the obtained results are marked in growth charts and a curve describing changes is drawn (see Elveback and Taylor, 1969).

5.1.1.2. Comparative Analysis of Social Indexes

To draw an example of assessment of social phenomena, three indexes will be compared in the following chapters: Social Development Index (SDI) (for more details, see Foa and Tanner, 2012), Social Progress Index (SPI) (for more details, see Social Progress Index, 2014) and Regional Social Innovation Index (RESINDEX) (for more details, see Resindex: Regional Social Innovation Index, 2013). The schemes of Docial Development Index, Social Progress Index and Regional Social Innovation Index are similar and meet theoretical index construction principles. All the indexes are composite and multidimensional where individual indicators in each dimension are given leverage coefficients. However, the indexes are used to assess different phenomena. All the indexes may be applied globally. A globally applied index aims to identify how an individual nation state meets certain social criteria, expressed in indexes. This may be important and useful when nation states are compared to each other and gives an opportunity to identify the progress or slippage of each country when best practices or weak points have to be spotted.

Social Development Index (SDI). Social Development Index has 6 dimensions, including civic engagement, clubs and associations, interpersonal security and confidence, gender equality and involvement of minorities. Construction of the social development index is based on the percentile method that eliminates problems of statistical errors caused by sample limitation and non-representatively (see Foa and Tanner, 2012). The method is useful as it gives an opportunity to subsequently add new indexes even from very small samples without losing index correctness.

Also, it grants opportunities to constantly adjust country scores by using data on their place in the range scale.

There is a range of several comprehensive indexes, applicable to several countries, on the basis of which policies of social regulation are shaped and corresponding practices are implemented, e.g., development of civic society, intergroup cohesion or reduction of gender discrimination. Social development indexes use various data of social institutions applicable in several cross-border surveys. The social development index comprises over 200 indexes from 25 sources, including international organizations, comparative research projects, rating agencies and academic institutions. Also, unlike in regressive analysis, the percentile method based data aggregation excludes difficulties in identification of leverage coefficients when the sample is very small. This is particularly important in construction of indexes, the values of which are based on provisional data to include new indicators when data becomes available even if the data are insignificant.

Social Progress Index (SPI). The social progress index is used to identify the level of social development and preconditions for members of the society to pursue prosperity. The index directly measures social prosperity and opportunities of its further development. The index combines three dimensions: essential human needs, wealth fundamentals and opportunities. The values of the index, as the values of the majority of its indicators, fall within a range [0,100] in order to set clear upper and lower limits of the indexes. On the other hand, there are cases where a different scale of indicators applies, e.g., greenhouse gas emissions have no *ex ante* set upper limit.

Regional Social Innovation Index (RESINDEX), introduced by *Sinnergiak Social Innovation*. Instead of describing the extensive subject of social prosperity, the index measures only a very specific subject of the society's readiness for social innovation. The index aims to evaluate organization's intellectual maturity that is necessary to introduce innovation. The regional social innovation index has 3 dimensions: *Capacity for Potential Innovation Index, Social Orientation Index and Social Innovation Index*. Data for the index are obtained by inquiring respondents. The index has already been tested in Spanish Basque Country; however, results from other countries are still uncertain. The indicator values of relevant variables are found by means of norming formulas. Also, formula for individual

indicators may be adapted to various organizations (business enterprises, universities, non-profit organizations). The presented formulas do not make it obvious that the values of all indicators fall within a range [0,1], but as long as they all may only have positive values, the problem of correctness in comparison of different regions is absent. On the other hand, RESINDEX may have values from 0 to 100 and so grants an opportunity to rate regions in accordance with their potential to introduce social innovation.

The recent scientific research in the field is mostly grounded on statistical methods identifying relative weights of variables corresponding to their significance. Despite the fact that statistical methods may reason the structure of an index, such reasoning is not always justifiable as application of statistical methods requires certain assumptions on distribution and correlation of the statistical data. Such circumstances make the assessment process more complex and sometimes adversely affect accuracy of the assessment. For example, in construction of the general index of country's financial stability, Van den End (2006) found that for some indexes, the difference between distribution of equal weights and econometric distribution of weights is insignificant. Also, a methodology based on the theory of fuzzy sets (Lee and Yu, 2013; Chiu et al., 2004) has been proposed in recent years. Fuzzy logic is understood as a general science about various information processes in the nature, technologies and society. It is an insufficiently unambiguously defined concept of information that is not always uniformly interpreted by scholars in different fields. Therefore, interpretations of psychological and social systems often change the term *information* into *knowledge* as *information* is intuitively understood as an attribute of technical systems, whereas *knowledge* is perceived as information used by an individual. On the basis of classical logic (Boolean), decision-making is grounded upon strict categories of *yes* and *no* with no possibility of a third option. This can be interpreted as a datum-level in the quantitative assessment of an attribute of variable X in view of the threshold level θ that predetermines a positive or negative decision. The threshold level θ may be set in two ways: from small to big X values in ascending order or from big to small X values in descending order. However, when a decision is being made by an information subsystem in accordance with the quantitative assessment of a particular attribute, the choice of threshold θ in accordance with

the assessment size *X* in cases of Boolean logic, where situations and attributes are assessed on the bases of opposites and comparison of their quantitative values, produces indeterminacies, i.e., the need for additional modes *uncertain* and *equal* occur (for more details, refer to Jasinevičius and Petrauskas, 2011).

Method advantages and limitations. Composite indexes are useful in management and decision-making theories and are widely used in practice both, in statistical justifications of adopted decisions and as a monitoring aid. The structure of a composite index explicitly illustrates how various indicators vary in individual dimensions. Therefore, composite indexes have several advantages: the used information is essentially preserved and clearly revealed in each individual dimension. On the other hand, composite indexes have certain drawbacks: even if the values of an individual index differ in assessment of different subjects, they cannot be correctly rated (see De Muro et al., 2009). Another argument against application of composite indexes is grounded on the fact that they usually fail to reveal additional information that may be represented by a single index, but requires more data for analysis.

Apart from numerous advantages, indexes based on statistical methods and data sometimes fail to correspond to a real state of an observed process as their values depend on input data. Correctness of the data predetermines correctness of the index. Such problems are dealt with by making respective assumptions about the noise of statistical models (i.e., the part of the data that is not observed and that are assumed in the choice of the model of statistical analysis) in generation of missing values or a similar data aggregation.

As in the vast majority of statistical analyses, a serious problem in application of social indexes is caused by shortage and inaccuracies in the data. Also, indexes are difficult to compare in cases of essential structural changes of the observed subjects or phenomena. Nevertheless, even in such cases, a number of statistical methods may be applied to deal with problems of structural or epidemic changes in random processes.

As methodology of index composition has now been exhaustively discussed, the next part of the monograph shall focus on issues of practical development of the indexes.

5.1.2. Conceptual Framework of Collective Intelligence (CI) Potential Index

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As mentioned in the previous chapter, "the Index is a numerical value that expresses the statistical relationship between amounts relating to the same phenomenon. Numerical value is precisely what gives us an insight on the phenomenon we hope to analyze and measure" (Regional Social Innovation Index, 2013). The proposed CI Potential Index modelling approach focuses on facilitating framework to evaluate online community projects and identify cases that can be potentially transformed into effective CI systems, as well as on "enabling developers to design, implement and optimize CI systems so that the community and individual benefits will be maximized" (Lykourentzou et al., 2011).

The methodology for CI Potential (CIP) Index calculation will allow the analysis, evaluation and assessment of CI systems. The CIP Index will show the conditions, state and dynamics of the CI according to changes of various internal and external parameters. The data necessary for empirical validation of the CI Potential Index parameters were collected during the theoretical analysis of scientific sources, quantitative and qualitative research and were revised during experimental application of the methodology (see chapter 3.1 for a methodological framework). To test relationships between different CI dimensions, the systems dynamic model of CI was developed (see chapter 5.5.).

The potential for Collective Intelligence is a relational conception that defines the capacity of an online community for aggregating and creating knowledge, creativity and decision-making, ability for self-organising, adaptivity and emergence of "swarm effect", as well as the level of social maturity, evaluated by the social impact on society and social motivation of participants, etc. CI Potential Index has been designed around three indices, which are defined by different dimensions: capacity level (macro level), related to diversity, independence and knowledge aggregation by interactions of massive participants ("wisdom of crowds effect", Lykourentzou, 2011; Luo et al., 2009); emergence level (emergence level), related to the system state of Collective Intelligence. The Collective

Intelligence systems are characterized by self-organization, and adaptivity and emergence of synergy (Luo et al., 2009), and social maturity level (micro level), based on the community and individual objectives, etc. (Boder, 2006). The authors have adapted the theoretical insights and valuable experience from Sinnergiak Social Innovation Researchers Group (see more in chapter 5.3.2. Regional Social Innovation Index) and defined for operational purposes 3 sub-indexes for CI Potential Index: Capacity Index, Emergence Index and Social Maturity Index (see Figure 45).

The design of the Index is also based on three levels of the abstraction in the discussion about CI of Salminen (2012). His representative literature review was performed on the Web of Knowledge selected papers in order to reveal themes relevant to Collective Intelligence and following a keyword search approach of Zott et al. (2011). Salminen (2012) discovered 3 types of patterns and grouping around the following themes: micro, macro and emergence level of CI. At the micro-level, Collective Intelligence is a combination of psychological, cognitive and behavioral elements. They provide the "rules", according to which individuals act (values, trust, motivation, etc.). Micro-level sets humans apart from other CI systems (robots, algorithms, etc.). This level is defined as Social Maturity Index. At the macro-level (Capacity Index in this classification), Collective Intelligence becomes a statistical phenomenon, at least in the case of the "wisdom of crowds" effect (Lorenz et al., 2011). The "wisdom of crowds" effect is claimed to be based on diversity, independence and aggregation (Surowiecki, 2005).

The level of emergence (Emergence Index) resides between the micro-level and the macro-level and deals with the question of how system behavior emerges from interactions at the macro and micro-level. According to Wolf and Holvoet (2005), "A system exhibits emergence when there are coherent emergents at the macro-level that dynamically arise from the interactions between the parts at the micro-level. Such emergents are novel with respect to the individual parts of the system". According to the previous research results (Skaržauskienė and Paunksnienė, 2013), the Social Maturity level is related to individuals or group characteristics, Capacity and Emergence levels are related to process/activity characteristics.

Theoretical insights and empirical research results reveal that at the current knowledge level capacity for developing collaboration

competencies, social and technological conditions for CI emergence and level of social maturity are important features of the CI systems. Measuring them could be useful in predicting the global performance of the system as a whole (see Figure 47):

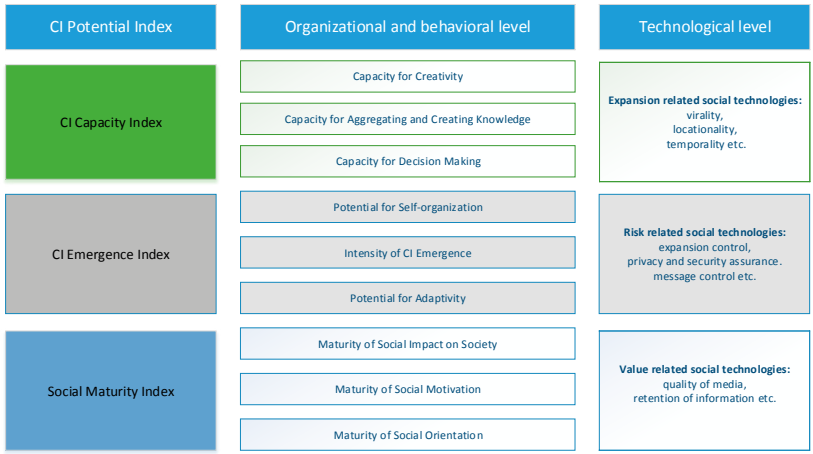

Figure 47. CI Potential Index Model

The authors elaborated on various dimensions which cover different aspects of each of the Sub-Index and created different components to measure each dimension, for example, the *capacity for creativity* includes 2 components: *degree in diversity in the source of ideas* and *degree of diversity in the engagement forms.*

Capacity Index Dimension	**Interpretation** *Macro Level*	**Components**
Capacity for Creativity	Identifies dynamism and openness of a community. The more varied structure of participants, the higher capacity for creativity.	Degree of diversity in the source of ideas. Degree of diversity in engagement forms.
Capacity for Aggregating Knowledge	Identifies the level of capacity for creating collective knowledge among community members.	Degree of interdependence. Degree of adequate supply of critical mass ("swarm effect").
Capacity for Decision-making and Problem-solving	Identifies the level of competencies for independent decision-making and problem-solving.	Degree of decentralization. Efficiency of problem-solving. Degree of independence.

Emergence Index	**Interpretation** *Emergence Level*	**Components**
Potential for Self-organization	Identifies the degree of self-organization to reach community task.	Adequacy in form of self-organization to community task. Degree of development of transparent structure and culture.
Intensity of Emergence	Identifies the intensity of emergence of new quality based on distributed memory and shared knowledge ("wisdom of crowd" effect).	Degree of development of new qualities in form of ideas, activities, structured opinions, competencies, etc. based on distributed memory system (Web intelligence).
Potential for Adaptivity	Identifies the degree of ability to adapt changes in socio-cultural context (local, national, global).	Degree of development of improvements and learning processes within the community. Development of life-long learning.
Social Maturity Index	**Interpretation** *Micro Level*	**Components**
Maturity of Social Impact *Behavioural*	Identifies the extent of civic engagement and impact on public opinion.	Degree of civic engagement. Degree of sustainability.
Maturity of Social Motivation *Psychological*	Identifies the maturity of motivation to deal with societal challenges.	Level of maturity of social motivation of a community. Level of social sensitivity of community members.
Maturity of Social Orientation *Cognitive*	Identifies the maturity of monitoring (identification) social matters and value of generated content for society.	Level of maturity of reaction to social issues. Degree of diversity in cooperating partners and financing. Level of maturity of generated content.

Each component related to the dimension reflects from grouping of different indicators. For example, the component *degree in diversity in the source of ideas* is measured by *percentage of females in the community, percentage of different nationalities and age groups, superadditivity (diversity in opinion, solutions, predictions, etc.)*. The indicators are divided to two levels: organizational and behavioral level based on questions about platform structure and activities (Web analytics or qualitative analysis) and technological level, grouped around technological parameters of the platform itself: expansion, risk and value-related social technologies

(more about technological indicators in chapter 5.3). Although many authors highlight the importance of such factors as societal influence, social orientation and motivation, involvement and participation in social activities, reputation index, etc., in the process of "growing" community intellectual potential, due to the limitations of this research study in scope and duration, the hypotheses in relation to social maturity impact on CI development were not constructed. Insights about the relevance of these factors were presented at the theoretical level and could be researched empirically in the future.

Capacity Index Dimension	**Components of dimensions**	**Indicator (based on Web analytics and/or qualitative analysis)**
Capacity for creativity	Degree in diversity in the source of ideas	Percentage of females in the community, percentage of different nationalities and age groups Superadditivity (diversity in opinion, solutions, predictions, etc.) Degree of development of external links
	Degree of development of engagement forms	Degree of participants (agents, members) outbound "sharing" activities, such as "send to a friend" or "share on Facebook') of community content by community members Realization of game based approach "Adaption for different age groups'
Capacity for aggregating and creating knowledge	**Degree of interdependence**	**Consistence of the network Network amplitude**
	Supply of critical mass ("swarm effect")	Total participation in site polls and surveys Total visits – the total number of times the site has been accessed or visited Unique visitors – the total number of different visitors the community has had Repeated visitors, the number or proportion of visitors who have visited the site more than once (ever, or over some period of time) Unique visitors/contributing visitors Conversion rate – the percentage of unique visitors who become registered members Number of contributions/contributors

Capacity for decision-making and problem-solving	Efficiency of problem-solving	Level of capacity for information processing, efficiency and timing with which group is able to solve problems Variety of problem-solving alternatives
	Degree of decentralization	Existence of diversity in forms for decision-making (group/individual; evaluate/select/ vote/consensus/ averaging) Equal rights for participants
	Degree of independence	Level of criticism Depth of problem analysis Existence of privacy policy and anonymity possibilities
Emergence Index	Criteria	Indicator (based on Web analytics and/or qualitative analysis)
Potential for self-organization	Degree of development of shared structure and culture	Existence of common community norms and regulations Existence of common community "mental models" Development of shared vocabulary and other infrastructure Top and total referrers – top referrers tell leaders where their site's traffic is coming from, which can be useful in determining relationship with other sites
	Adequacy in form of self-organization to community task	Adequacy of type of leadership to community task (hierarchy, crowd, distributed leadership) Adequacy of task to category of community (collaborative and competitive, centralized, decentralized) Adequacy of task to community members motivation Balance between communities and individual objectives Degree of transparency
Intensity of the emergence of CI	Degree of development of new qualities in form of ideas, activities, structured opinions, competencies, etc.	Number of new ideas, decisions, prototypes, activities, innovations, structured opinions Aggregated position (idea improved after comments) Diversity of created knowledge/products Exhibition of higher-level intelligent capability than any community member
	Development of distributed memory system	Capability of "intelligent" problem-solving, i.e., the capability of utilizing the stored knowledge to solve problems Systemized relevant scientific and technological information in the field
Potential for adaptivity	Ability to adapt changes	Adequacy to socio-cultural context (local, national, global) Degree of development of improvements and learning processes within the community

Before developing the CI Potential Index concept, we have tried to answer the question how different social technologies could help to structure the information, purify the positions, reconcile different opinions and formulate the real society voice, etc. The next chapter is aimed to show how existing social technologies help platform developers to create new IT-based applications fostering self-organization, collective decision-making and learning, etc.

5.2. Social Technologies for Development of Collective Intelligence

5.2.1. Technological Dimension by Calculating CI Potential Index

The novelty of this research project is the original approach to the interaction of social and technological sciences, which is based on interdisciplinary experience. Collective Intelligence created using social technologies is increasingly salient as an object of study for the social sciences since sociality is more and more something that people create technically. "Technology does not determine society it expresses it. But society does not determine technological innovation: it uses it" (Castells, 2000). As discussed earlier, the information and communication technologies are critical for the formation of CI. According to Malone et al. (2010), behavior of groups of people is in focus of all social sciences, yet it overlaps with Collective Intelligence when studies concentrate on overall collective behavior that could be considered more or less intelligent, e.g., analyzing how to determine individual attitudes would not be central to CI. Focus on diverse organizational designs increasing efficient collective performance would be important for CI researchers. Another subsequent question would then be "how the community and community intelligence can be supported by the information and communication technologies" (Lou et al., 2012) or, more specifically, how social technologies could contribute to the development of Collective Intelligence in the networked society?

In this chapter, the evaluation of different social technological tools and platform's designs was performed and conclusions about their influence on networked entities performance formulated. Also, attempts were made to understand the impact tools and design of various social technologies have on results of network project activities.

Because the Internet has become an extensive distributed inventory of information and knowledge, it partially fulfils the functionality of a

distributed "memory" system. "Incorporating all sorts of computing and information processing technologies (e.g. the Semantic-Web-based reasoning tools, Web Services and other Web-based applications), the Web platform has obtained some capability of intelligence in its own right, and such Web intelligence may be furthermore combined with participants" human intelligence to form higher-level community intelligence" (Zhong et al., 2003). Considering this, a relevant CI system framework must contain organizational/behavioral as well as technological components. In our model of CI Potential Index, organizational/behavioral and technological dimensions are defined. Effective social networking technology should possess the following three relevant characteristics (Girggs and Wild, 2013): capacity/expansion-related technologies at capacity level, emergence/risk-related at emergence level and value-related at social maturity level (see CI Potential Index Model in chapter 5.2). The processes involved in designing and implementing specialized Collective Intelligence applications in different online community projects are discussed below.

At the capacity level, information technologies require to be employed to fill the knowledge gaps between individuals through transfer of knowledge from one person to another. The "knowledge organization" (Hjørland, 2003) and "knowledge visualization" (Eppler and Burkard 2004), as well as Web 2, Web 3 tools, could be very valuable in this aspect. "More computing tools that are developed under deeper comprehensions of group and social cognitions would also be worthy of pursuing" (Luo, at al., 2009). As it has been widely discussed in the paradigm of Knowledge Management, knowledge could be represented as a networked structure – "a semantic network of concepts and predicative relations, a linked structure of a set of reasoning rules, or elements interconnected by a cognitive schema or a mental model" (Lou et al., 2012). Therefore, the conclusion would be that technologies for building network structure influence the knowledge creation process. Existence of technologies for decision-making (group or individual) is an important tool for development of potential capacity of CI. Small and homogenous groups can reach consensus in a reasonable amount of time, but "reaching complete consensus in a large or diverse group is often impossible, so voting is usually better in these cases. Voting is also useful when it is important to have everyone committed to the outcome" (Malone et al., 2009). E-voting can be effective when reaching for consensus

among numerous and dispersed groups but is most useful when a small number of possible choices is available (Klein et al., 2007). To enable a crowd to estimate numbers under conditions of uncertainty, one can use averaging (Malone et al., 2009). Group Decision Support Systems could be applicable for collective brainstorming, but only in small groups (Gopal and Prasad, 2000). The most complex discussed technological solution is mass argumentation. These tools should eliminate limitations of the previously mentioned social technologies (Kirschner et al., 2005; Moor and Aakhus, 2006). Mass argumentation allows focusing participants" interactions into a network consisting of three elements: problems, options and arguments (Klein et al., 2007). These measures, if properly designed and implemented, help to structure even the most difficult discussions and achieve results. Mass argumentation solutions provide the best conditions for the development of CI (for example, in wikis important aspects that facilitate instrument efficiency are mass collaboration, transparency and pull versus push mechanism).

Table 28 presents several concepts of the most popular interactive community oriented platforms.

Table 28. Concepts of decision-making focused on interactive media systems

Concept	Definition
Proposition development process	The system is based on a structured feedback that regulates communication between voters and initiators. To receive more support, an initiator has to make changes in accordance with voter preferences, and voters, in their turn, influence development of the idea or even initiation of a new idea by providing their feedback.
Preferential voting	The concept is based on a complex voting system known as Cloneproof Schwartz Sequential Dropping (CSSD) and also referred to as Schulze method. The system does not encourage participants to vote in support of the majority opinion or seek compromise against their will.
Map/reduce paradigm	The concept is focused on two computer techniques: *divide and conquer*. Problems are dealt with by dividing them into smaller units or communicating them to parallel computers and subsequently aggregating (Horowitz, 1977; McDonald, 2011). For example, in CrowdForge platform, each participant is given a small portion of the problem and deals with the problem individually, whereas the general solution is arrived at by integrating new knowledge.

Virtual brainstorming	The system uses special network communication software adapted to social activities and interactive technological solutions realized as a virtual brainstorm that ensures feedback between all participants and other interested actors, supports interactivity of the educational process and encourages healthy competition, partnership and cooperation. Voting for proposed ideas is held anonymously, assessments involve both experts and ordinary users, each participant can see deviation of the personal assessment from the general result or from expert evaluation when the project is over (Norvaišas, 2011).
Human computation	Unlike such big systems as Wikipedia or Linux, the conception divides human workload into computer units controlled and arranged by mashine controlled systems and processes (e.g., such computer games as Fold-it, TagATune and ESP coordinate human activities in a precisely described way). Along with crowdsourcing, the conception opens new CI development ways (Cooper et al., 2010; Law and von Ahn, 2009) as it creates a wide variety of forms and integrates motivation factors and computer structures. Some systems use intrinsic motivation factors to involve volunteers, for instance, into video film making, other platforms offer monetary reward (e.g., oDesk and Amazon Mechanical Turk (MTurk)). The conception may differ in the ways of decision-making or activity coordination. New tools, such as TurKit, CrowdForge or Jabberwocky, have created an opportunity for designers to develop more and more complex algorithms that allow organization of parallel activities along with interactive processes (Kittur et al., 2011).

Klein et al. (2007) discuss different technological solutions applicable nowadays enabling interaction on the global scale (emergence level). Most common technologies are synchronous and asynchronous: chat tools (e.g., e-mail) as well as open forums (e.g., blogs). Other technological solutions allow for more advanced forms of CI to emerge. Expert markets (e.g., Quora.com) enable stakeholders to collect ideas from around the world (Dennning and Hayes-Roth, 2006). However, the ideas itself are not necessarily created in a collective manner. Another type of solutions, prediction markets, can "function effectively even when most market participants have little relevant information, because only the well-informed participants are motivated to trade heavily" (Malone et al., 2009). Prediction markets enable sizable human groups to reach sometimes surprisingly accurate estimates of given hypothesis or problem (Wolfers and Zitzewitz, 2004). Adequacy of a community task and technologies for decision-making could have a huge impact on a potential emergence of CI. In this CI dimension, it is important to attract a necessary number of users to create *swarm effect*; therefore, it is important to think about technological decisions that would encourage participant motivation. Another important condition for CI to emerge is that apart from receiving

access to the software of the platform, users have to understand the essence of technologies and know how to use technologies to achieve their goal. Technological innovations should be clearly introduced, easily mastered and create value added (Gregg, 2007).

At the social maturity level, social technologies support the knowledge activities in a community: promote engagement and participation, facilitate more dynamic and "democratic" knowledge dissemination and integration, foster sustainability, etc. Alteration of CI development conditions in the context of technologies requires a new approach towards the potential of technologies from software designers. Software developers gave focus on issues of values, the purpose the software will be used for and features that would increase the quality of visualization and encourage social interaction. New generation applications focus on user needs and aim at technological innovation to ground decision-making, teamwork and better mutual understanding. The user plays the major role in deciding what data is necessary and what information should be used. The major features of CI systems may be compared to Web 2.0 or Web 3.0 applications, having in mind the difference that Web applications are created exceptionally for vast audiences, whereas systems of Collective Intelligence may be more specialized and smaller in their scope.

To sum up, principles formulated by O'Reilly (2005), Gregg (2007), Kittur et al. (2013) and other researchers allow an assumption that online communities have to be designed to pursue specific goals and clearly represent the goals in their design. Privacy and personal data protection helps create a potentially active community and encourages diversity of opinions; therefore, it is crucial to introduce technologies safeguarding user security and, in some cases, anonymity. The core of CI systems is information and data; therefore, applications should be designed so as to allow knowledge accumulation and exchange of information among the participants. As users of communication platforms create value added, mechanisms granting the users a possibility to modify, supplement or otherwise contribute to the content quality become important. Knowledge accumulation creates value added in CI systems and has to be performed in a natural way in the course of regular use of the application (Gregg, 2007). Knowledge and information created and accumulated in a CI system may be evaluated even outside the system; therefore, it is important to ensure mechanisms of communication and data exchange with the outer

environment and create a possibility to reuse the collected data. Apart from computers, modern applications have to be applied to all kinds of electronic devices via integration of Internet servers and integrated maintenance of gadgets. *The perpetual beta* service should be installed as a norm and constantly update the application in accordance with developing user needs (Gregg, 2007). Girggs and Wild (2013) emphasize the importance of design and media quality: the platform has to be user friendly and offer fast and advanced software that is regularly updated in accordance with developing user needs. The qualitative research has revealed that special attention has to be paid to involvement of users, in particular young generation, into community activities. The influence of gaming technologies on the emergence of collective creativity is explicitly analysed in the next chapter.

With the aim to evaluate technological readiness of on-line communities to generate Collective Intelligence, an instrument for measurement of social technologies has been developed on the basis of theoretical insights and tested during a scientific experiment (for more details, refer to chapter 5.4).

5.2.2. Gamification Technologies for Developing Collective Creativity

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Manifestations of individual and collective creativity can be observed in almost all areas of human activity. Creative products are inseparable from innovations and the concept of progress. Although creativity is vitally important for the development of civilisation, this phenomenon has not been comprehensively disclosed yet. Authors agree that creativity is a feature which inspires something new, original and different (Csikszentmihalyi, 1996; Boden, 1994; Schank and Cleary, 1995). Although collective and individual creativity have some features in common, there are quite a few differences between them. In Western culture, a creative personality is particularly valued even though most human progress has been achieved via the collective creative work. Another important aspect is creativity according to the field. Such professional fields as painting, music, design, literature, acting, etc. have been traditionally perceived as more creative than others; however, such an approach can result in a very narrow perception of

the phenomenon. The results of non-standard creative mind can manifest themselves in a great variety of contexts, ranging from cuisine to group work in a class. "The creativity spark" is not something accidental or mystical as it might seem at first glance. Quite often, it is the result of purposeful and intensive work determined by the contribution of team members and socio-cultural environment. Pirola-Merlo and Mann (2004) state that while one is involved in creative activity, his/her work environment can act both as a stimulating and a limiting factor; however, this is not the most relevant piece of the puzzle. It is far more important that every member of the team makes his/her own contribution to the creation of the final product, and this rule does not apply only to those fields that have been traditionally perceived as creative. Due to this, attributing creativity to a definite field is related to products or processes that represent the field rather than to creativity itself. On the other hand, individual creativity is understood as a personal feature or a given possession. Even though in the Western culture the idea of "the creative spark" is stressed particularly frequently, facts witness that accidental enlightenment of consciousness is related to having a comprehensive background of expert knowledge and facing a challenge which is equal to the creator. Louis Pasteur stressed that "Fortune favours the prepared mind" (Dunbar, 1999). Paraphrasing this saying as "a ready mind favours a probability", it can be stated that both individual and collective creative competencies are the result of the long-term and intensive attempts of one's will and consciousness, which may be influenced by socio-cultural factors and creators" personal features.

Developing creativity is important not only for the development of a personality or organisational competitiveness, but also for the sustainable development of an economy or a country (a region). The societies that use the creative potential have bigger chances to compete on the global arena (Florida, 2002; Pink, 2005), thus, developing this feature is important not only as a means to measure individual or group productivity, but also as a basis for the welfare of states (economies). According to the Global Innovation Index 2014, the best innovation results are demonstrated by the countries which income per person is the highest (Table 29).

Table 29. Fifteen leading countries according to the Global Innovation Index.

Country/Economy	Score (0–100)	Rank	Efficiency Ratio	Rank	Median: 0.74
Switzerland	64.78	1	0.95	6	
United Kingdom	62.37	2	0.83	29	
Sweden	62.29	3	0.85	22	
Finland	60.67	4	0.80	41	
Netherlands	60.59	5	0.91	12	
United States of America	60.09	6	0.77	57	
Singapore	59.24	7	0.61	110	
Denmark	57.52	8	0.76	61	
Luxembourg	56.86	9	0.93	9	
Hong Kong (China)	56.82	10	0.66	99	
Ireland	56.67	11	0.79	47	
Canada	56.13	12	0.69	86	
Germany	56.02	13	0.86	19	
Norway	55.59	14	0.78	51	
Israel	55.46	15	0.79	42	

Source: Global Innovation Index Report, 2014

A high position in this rating in most cases corresponds to a bigger ratio of innovation efficiency; however, this rule is not absolute. For example, the United Kingdom takes the second position according to the Global Innovation Index, but it is in the 29th position according to the innovation efficiency. Malta is the third according to the ratio of innovation efficiency, but it is the tenth according to the innovation index. Lithuania is in the 39th position according to the index scores, but it is in the 89th position according to the innovation efficiency. Comparison of both criteria shows that countries with stronger economies distribute their resources in a more appropriate way (Figure 48).

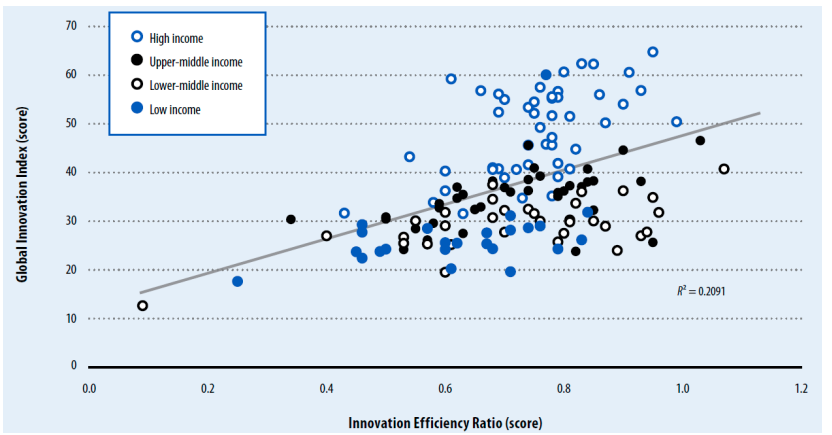

Figure 48. Innovation efficiency ratio under the Global Innovation Index

Source: The Global Innovation Index Report, 2014

This situation produces negative consequences, too, which include the risk of innovation exclusion. Due to the existing differences of the living standards, flawed policy of innovation management, corruption and other factors, poorer countries have less chance to introduce technological innovations and new ideas. Depending on the type of economy, low income countries are likely to be suppliers of raw materials and agricultural production, whereas high income countries and countries oriented towards high-technology industry invest in new research and implementation of innovation. This situation deepens the division as to the possibility to use creative decisions to foster growth of economy sectors because low income states simply cannot compete with the developed and rich countries. One of the ways of making the division smaller is adapting the needs of industry to the global trends while attempting to attract investment from countries having a high innovation rank. A similar strategy has been followed by Malaysia, Costa Rica, Israel, and the part of China that has access to the sea (Sachs, 2003). On the other hand, there exist examples of exclusive success of innovations use, such as Taiwan and South Korea, both of which in almost 40 years managed to raise the number of innovations from almost non-existent to extremely high numbers. Attracting investment for the implementation of innovations is a relatively fast way of acquiring creative products. Thinking about a long-term economic perspective of a country, it is equally important to create conditions for the development of creative potential of local people. This also requires much investment, appropriate education, family and business policies. People's wish to create, their motivation to solve problems and find methods to improve different areas is equally important. The use of game mechanics for solving real challenges can involve one in creative activity which will not require big financial resources and will motivate the players to use the possibility to act freely as well as will provide a challenge to a person or a group of people in an important context.

Gamification can be used as one of the ways to develop individual and collective creativity. Being a relatively new method, it attracts more attention both in the academia and in public life. Gamification is based on some playful design elements that create unique experiences, the aim of which being to attract people into problem-solving through the game layer. Gamification is to cause immersion, involvement and the condition of flow, in which a person feels a growing interest in the activity and actively

accepts information (Csikszentmihalyi, 1996; Douglas, 2001; Brown and Cairns, 2004). When used to develop creativity, gamification can promote motivation to create and widen one's knowledge, which is one of the most important elements of a creative action. On the other hand, gamification should be used with caution because different types of personalities (players) can be motivated by different means of game mechanics. Later in this chapter, the preconditions of using gamification for the development of individual and collective creativity through different types of players will be discussed.

The use of gamification towards creativity. Gamification is a relatively new concept related to the use of elements of game mechanics in the areas which by their nature are not meant for entertainment. Depending upon the context, this concept can be ambiguous because both the method itself and the field of its use have not been settled yet. Nonetheless, gamification is actively entering different domains forming a technological trend which will eventually affect many people irrespective of their inclination towards the game culture. One of the main preconditions of the growing popularity of gamification is the maturity of the so-called "Y generation". This generation is, on the one hand, frequently criticised for its narcissism, lack of responsibility, distancing from the real world; on the other hand, it is considered to be tolerant, self-confident and capable to easily adapt to environmental changes (Twenge, 2006). However, when viewed through the prism of gamification, "Y generation" is characterised by a common understanding of information communication technologies (ICT) because their representatives were brought up during the time of the development of computer technology, networks, mobile platforms and during the period of the transformation of communication and leisure culture which was greatly impacted by the spread of the Internet. However, it does not mean that "Y generation" is creators of technologies. They are defined as users who are willing and capable to use ICT, who have a need to be seen and who have virtual connections. Another feature of "Y generation" is their inclination to entertain and to external stimuli which affect their internal motivation. Video game culture, which has become particularly popular in the recent 15 years, is one of its causes. According to the 2013 data presented by the Entertainment Software Rating Board, in 67% of households in the USA video games are played and the player's average age is 32. Gartner, IT consulting company (2013), has predicted

that by 2015 the world video game industry will reach 111 billion US dollars, which is 10 times more than the annual income of Hollywood production. In this environment, young players get used to constant achievements, awards and, in general, to the stimuli which motivate to act or sustain from certain behaviour. Gamification helps to satisfy this need by transferring some game features to non-traditional environments and in this way seeks to encourage and motivate target groups. "Y generation" is just a primary gamification target. Sociologists and demographers speak about the dawn of "Z generation". Although there is no agreement as to the dates which could denote the exact chronological landmark of the new generation, the opinions prevail that these are the children who were born after 2000. They are also called digital natives, net gen, gen Wii and the like. All the names are related to certain technological phenomena of that time which totally transformed the culture of work and leisure. Digital gadgets do not cause any stress to digital natives, who use them willingly and easily understand the subtleties of their management, look for digital content and create it themselves. "Z generation" does not recognise old arcade games, where most of digital production was experimental and oriented towards a younger audience. On the other hand, they have exchanged the real world constructors into Minecraft, where they create, fight, and seek for recognition (Duncan, 2011). "Z generation" is the generation of future players and seekers of interactive entertainment. It is likely that gamification will become for them a natural and self-evident thing diluting the greyish cocktail of the reality.

In the context of this work, gamification is understood as the use of game mechanics in the contexts that have no direct parallels with a game as a form of entertainment (Deterding, Dixon, Khaled and Nacke, 2011). The method being analysed here, as contrasted to games or serious games, is different in that it does not directly require a narrative as a space for the realisation of structural elements (mechanics). In the case of both games and serious games, a narrative is used as a platform for analysing the world and interaction. The narrative may be overt or covert, and in both cases it is an indispensable element of design. Nonetheless, this rule has some exceptions. According to the data of the Entertainment Software Association (2014), casual games usually account for more than a third of all games being played. This type of entertaining production is particularly seldom based on a narrative; however, it differs from gamification

platforms in that the latter use elements of game mechanics (design) that promote involvement into the activity, which by its nature is not an object of entertainment. Gamified content can also have a narrative line; however, it serves the purpose only to increase involvement in performing concrete tasks that are related to overcoming more complex challenges. In the context of this chapter, game mechanics and design are understood not as the fulfilment of technological details, but as fundamental ideas that provide a game its typical form and create a medium for internal dynamic interactions. Elements of mechanics can vary, starting from the systems of dots and levels and finishing with means of rewards or leader charts. Schell (2008) stresses that there exists no common game mechanics and taxonomy; therefore, the use of its elements should depend upon the purpose of the game and the context in which it is used. In the case of gamification, elements of mechanics, dynamics and aesthetic presentation of the context act as means aimed at solving more complicated tasks and raising interest in the activity as well as promoting deeper involvement in the process of task solution.

What is more, games provide a possibility to test different activity scenarios within the framework of rules and restrictions. Elements of mechanics predetermine the possibilities of interaction between the main parts of the game and create a frame on the basis of which the player himself/herself chooses the game style or ways of task implementation. At this point, it should be explained in more detail what is meant by a game or a non-game dimension because both video games meant for entertainment and serious games or gamification are not infrequently not related to the feeling of "fun". Caillois (1961), who wrote one of the first books about games and their interaction, distinguished two categories of games, mainly, expressive games that are based on improvisations and are free – *paidia*, and games restricted by rules and oriented towards a goal – *ludus*. The latter form of games is the object of video games and gamification (Figure 49).

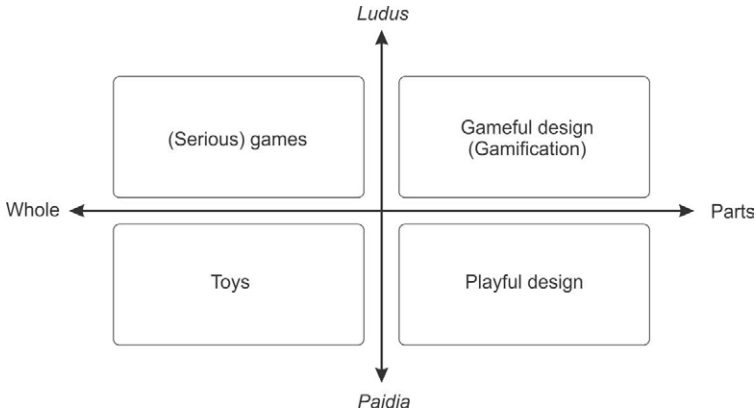

Figure 49. Distinction of gamification and other forms of games in the context of Paidia and Ludus Source: developed by the author after Deterding, Dixon, Khaled and Nacke (2011)

Sometimes game mechanics, dynamics and aesthetical elements suggest methods that are appropriate (more effective) to reach the aim; however, the optimal construction of the game world is the one in which the player has a certain degree of autonomy, challenge-based competencies to fulfil the tasks and feels related to the game content (Deci and Ryan, 2000; Przybylski, Rigby and Ryan, 2010). The implementation of these principles allows the player to make original decisions with the help of which alternative scenarios and means of task fulfilment are found.

Search of original solutions is one the most important attributes of creative activity. The ability to depart from the clichés of the interpretations of standard situations is a multifaceted process which demands expert knowledge of a particular area, motivation to act and personal creativity features. Nonetheless, creativity as a phenomenon has not been fully understood yet. Research carried out in this area is fragmented and frequently concentrated on a narrow research field; thus, there is lack of interdisciplinary context. Csikszentmihalyi (1996), one of the most prominent researchers of creativity, defines this phenomenon as "any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one". Transformation is inseparable from the ability to deal with information and a person's non-standard approach towards the possible starting points while solving creative tasks. Nonetheless, while analysing creativity, one faces theoretical contradictions, specificity of the area,

personality factors, influence of the environment and other problematic factors that make this phenomenon particularly complex. Boden (1994) underlines the paradoxical nature of creative activity, as during this activity it is sought to create something from nothing; thus, comprehension of this phenomenon could help to use individual and collective creativity potential more purposefully and to foresee the areas where people could act most efficiently. Understanding creativity is important for several reasons. Firstly, the ability to act in a non-standard manner helps to adapt to the changing environment. With the growth of ICT, not only the pace of life, but also the erosion of some professional areas is accelerating. This means that people cannot rely on the acquired skills and knowledge for a long time and have to constantly adapt to the new needs of the labour market. Secondly, the rising standards of living and global business environment stimulate consumption and a more intensive manufacturing of products. As the result, their life cycle is becoming shorter. To change the existing products by new ones, different types of innovations are necessary, and their creation and launch are inseparable from creative thinking. The number of innovations is not a decisive factor determining the competitiveness of a country or economy. The ratio between the incoming and outcoming innovations is important as well as is the effectiveness of the distribution of innovation funding. Socio-cultural factors also make an impact on the understanding of creativity; thus, management of individual and team resources can be a tough task particularly working with international teams. In any case, creativity is understood through the analysis of a problem (or by establishing a problem) in a certain area so that the solution method which has been used is acknowledged to be less effective than the new one.

Despite the existing potential to research creativity development, there exist quite a number of differences between how creativity should be understood and on which levels it should be analysed. Psychologists, sociologists and representatives of other branches of sciences have different opinions about this issue. There exist individualistic and sociocultural approaches in the context of which creativity is seen from different perspectives. In the former case, abilities of thinking, understanding, memorising and learning are stressed. A creative product is associated with novelty, a mix of ideas and skills, and a tangible and measurable outcome of a creative process (a creative product). However, environmental interaction is not listed as a factor making an impact on creativity. Contrary to the

individualistic approach, the socio-cultural approach employed to explain creativity is characterised by the impact of the external environment on a creating person or a group of creators. Its essence lies in the belief that the contexts of cultural and social spaces, which are favourable for cooperation, are inseparable from the manifestations of creativity. This approach also underlines the role of team activity; thus, not infrequently the socio-cultural explanation of creativity is close to the one used in innovation management. Amabile (1998) states that the manifestation of the results of creative activity in an organisation is a crucial precondition for the creation of innovations. But contrary to the individualistic approach, novelty is understood as a conditional factor which strongly depends on the socio-cultural context (Sawyer, 2012) because something which is new for one group can be a long established fact for another. In this case, things that are common for both approaches are stressed, which, to be more exact, include the intensifying phases of identical creative activity that manifest themselves both while creating individually and in a group.

While analysing creativity through the prism of gamification, it is important to reveal the factors that form the basis for creative thinking and how to stimulate them using elements of game mechanics. Problems arise not only due to the lack of empirical data that confirm a positive impact of gamification on creative productivity, but also due to different subtleties related to the use of gamified content for different personality types. Researchers have different opinions on general aspects of creativity as well as on the impact of gamification on different processes. The following part of this chapter will concentrate on the research related to the use of gamification in different areas of creative practice.

5.2.2.1. Literature Review

The popularity of gamification is growing both in the context of general search results and according to the number of research publications. The idea of using elements of game mechanics in non-game contexts is not new, but with the rapid spread of smart gadgets, intuitive user interfaces and the Internet, this idea is undergoing a renaissance both in the context of information/entertainment media and in researchers" works. According to Google Trends data, during the recent four years, the term queries in Google search engine have grown significantly (Figure 50). The curve presented in the diagram reflects a change in the search

of the keyword "gamification" within the range from 0 to 100, taking into consideration all Google query results over the period from January 2011 until November 2014. Harman, Koohang and Paliszkiewicz (2014) investigated citation frequency of scientific publications and drew the conclusion that the interest in gamification as an area of science is growing. Hamari, Koivisto and Sarsa (2013) carried out the analysis of publications based on the empirical research related to the operation of gamification.

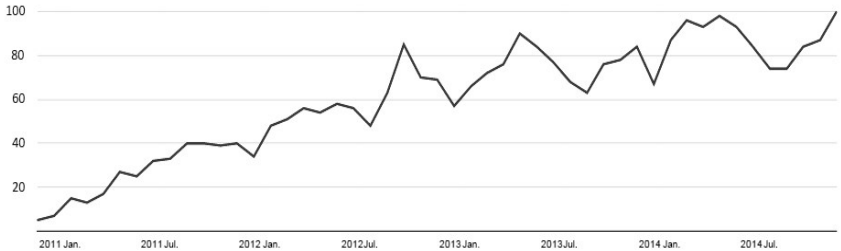

Figure 50. A change in popularity of the query "gamification" in Google search system.

Source: Google Trends

The authors focused on the research production published in the well-known data bases (*Scopus, Science Direct, EBSCO Host, Web of Science, ACM Digital library, AISel, Google Scholar and Proquest*). The main question which most research sought to answer is "Does gamification work?". Most articles state that the use of gamification makes a positive impact on psychological and behavioural levels; however, the results mostly depend on the context in which game mechanics is used and on the people who use gamified content. Thus, only a few publications examined the gamification phenomenon from specific perspectives, such as the use of collective wisdom and Internet contest of ideas.

The present research trend of investigating gamification is focused on business and educational needs; thus, the number of research articles investigating the impact of gamification on developing collective and individual creativity is small. Nonetheless, there are several peer refereed articles related to the use of game mechanics in a concrete area of creative activity. Pérez (2014) investigates manifestations of creativity and involving the audience in theatre performances using elements of game mechanics. The author distinguishes between theatrical creativity and game creativity,

as in the former type of creativity a space which is free from restrictions and which can disclose multidirectional creative experiences is required. On the other hand, in the world which is based on the rules of the game, the player has to follow preliminary criteria in the interaction of which he/she uses his/her creative thinking. Despite the differences between the formats of a free game and a game restricted by rules, the author stresses that the use of game mechanics helps to implement the ideas of the "theatre without the fourth wall" by involving the audience into the performance. Yuizono, Xing and Furukawa (2014) analyse the effect of gamification on the electronic system of "brainstorming". The authors state that gamification elements acted as effective catalysts that determined smoothness, flexibility and originality of ideas. Witt, Scheiner and Robra-Bissantz (2011) studied a case of Internet contest ideas and revealed that the use of game mechanics can stimulate involvement and the condition of "flow", and at the same time they underlined the importance of gamification quality. The use of game mechanics using crowdsourcing received different evaluations in the study carried out by Solf, Schultheiss and Staeudtner (2014). Some experts considered that motivating system participants was an advantage of gamification, whereas other informants held a more sceptical view claiming that gamification could be used only as an attribute for maintaining a feedback relation. Bennett, Koh and Repenning (2013) investigated a change in pupils' creativity while creating video games. The research results showed that the use of visual involvement stimuli determined the variety of results, which was directly related to a higher level of creativity. Besides, there are research publications that report the impact of gamification on separate areas of creative activity (not focusing on the dimension of developing creativity). Cronk (2013) analysed students' involvement in lectures and frequency of their participation in seminars. The author used the system of points as an element of game mechanics stimulating student motivation. The research results revealed that the use of this element increased the learners' activity. Similar results are also presented by Domínguez et al. (2013), Fernandes et al. (2012), O'Donovan, Gain and Marais (2013), Iosup and Epema (2014) and other authors.

Literature overview reveals differences between the results of quantitative and qualitative research. Quantitative research results not infrequently demonstrate the relationship between the use of gamification and bigger involvement in activities, whereas qualitative research results

show contradictory evaluations of the perspectives of the use of gamified content in certain areas. Such a trend should not surprise anybody because the spread of gamification, just like the spread of any other new technology, not infrequently causes scepticism and the reaction of rejection. On the other hand, there are quite a number of samples of gamified content which is poor from the point of view of its aesthetic expression and which has a low quality of general mechanics. This aspect is also highlighted by the research participants; thus, while using the method of gamification, not only is the dynamic relationship of the game mechanics elements important, but also is its aesthetic expression which is the primary source of feedback relation to the user. One more detail pointed out by Zichermann and Cunningham (2011) is the quality of content. According to the authors, it is not possible to gamify the content which is not relevant, badly prepared or the content which is in principle unsuitable, because the game layer is only a means of design and presenting information.

Thus, research analysing gamification in the context of some creative areas is rather fragmented and presents different results about the use of game mechanics in non-gamified contexts. Nonetheless, most authors claim that there exists a strong relationship between the use of gamification and the players' involvement in activities in different areas. The field of research and the quality of gamification should also be stressed as being important factors, because due to the novelty of the method its use is in a piloting stage; therefore, one will have to wait for the guidebooks on the methods of measuring gamification quality. In the following part of this chapter, relations between gamification and individual as well as collective creativity will be analysed while disclosing similarities and differences in the context of motivation theories.

Preconditions of using gamification for the development of individual and collective creativity. Every game or gamified content is based on several psychological categories that hold the player within the framework of artificial environment and create preconditions for involving a person or a group of people into the process. The first category is immersion. This is a passive experience based on empathizing into the world of the game. If a person is under this condition, the boundaries of the real world get blurred; he/she identifies himself/herself with the story and characters of the virtual reality and becomes part of the world of the game. Brown and Cairns (2004) state that immersion is close to the condition of

flow, which was analysed in detail by Csikszentmihalyi (1975). The flow is a narrow channel between boredom and frustration to those involved to the point when a person immerses into the activity the most and the real world sinks into the background (Figure 51). People who experience the flow lose the track of time, the scope of information absorption grows, tiredness disappears, and an influx of creative strength is felt. According to Groth (2013), under the condition of flow, modifications of the level of difficulty are desirable because they induce the player's wish to overcome an obstacle and stimulate deeper involvement. Every game seeks to hold its players in the condition of flow. Involvement is one of the most important factors which create preconditions for the rise of flow. Contrary to immersion, involvement is related to active participation (Douglas and Hargadon, 2001). The player not only becomes part of the virtual world, but also actively interacts with its elements. The phenomena of immersion, involvement and flow create preconditions for unique experiences to appear in the game. However, the elements mentioned above define the aspect of a momentary interest in the worlds of the game. A more comprehensive theory which reveals how the principles of motivation act was presented by Deci and Ryan (2000). At present, the theory of self-determination is one of the most popular theories explaining the origin of motivation. It is based on three conditions (categories) and if they are satisfied, a framework for motivated acting is created. The researchers state that people get involved in a certain activity if the three conditions are ensured.

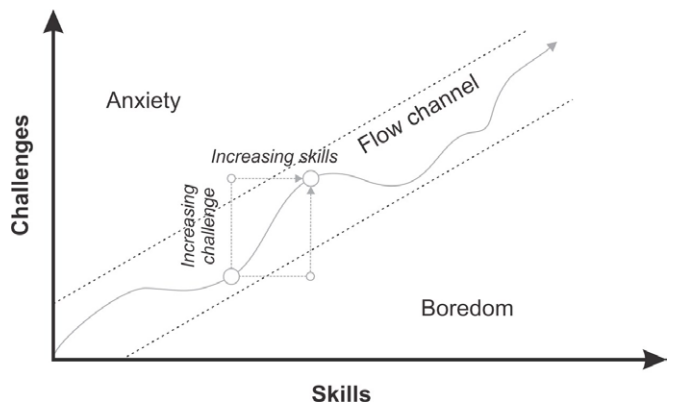

Figure 51. The condition of flow

Source: developed by the author after Csikszentmihalyi (1975)

The first condition is autonomy or a wish to act, which stems from internal incentives. The ability to feel free and individually decide which sequence of actions to take or tactics to choose ensures a person's involvement in the activity. On the other hand, external motivators, such as monetary rewards or the cause-effect method (if … then), can disrupt internal motivation because a person feels pressure to choose one or another pattern of behaviour. This does not mean that while implementing autonomy, external motivators are not possible. However, they must be moderate and complement internal voluntary direction of the activity without understating and putting freedom of choice into the foreground. The second condition is competence, i.e., the ability to fulfil tasks, and the feeling of challenge which is related to the tasks. The environment in which it is easy to reach the aim is not involving. The ability to improve, to raise the level of abilities and knowledge increases the participant's curiosity and determination. However, tasks should be clearly formulated and have a strong feedback relation. The third category is interconnection. This includes the participant's parallels with the task under the fulfilment. In the case of games, it can be a narrative relevant to the player, a group of virtual friends or an activity connected with the areas of the player's interests. Przybylski, Rigby and Ryan (2010) used the theory of self-determination while investigating the inclination to play video games. Virtual worlds can involve a person by the feelings of freedom and possibilities. As each game is based on a definite collection of rules which has a limited number of restrictions and patterns of dynamics, its requirements can be met easier than solving challenges in the real world. The player can spend the whole night running across the world of the game in order to find a valuable artefact on its edge and at the same time he/she can have particularly low motivation to run even a small part of that distance in the real life. In other words, there is lack of internal and external motivation to fulfil boring routine tasks. At this point, gamification can be useful as a method of "supplementing" the reality. Curiosity is aroused and an impulse to a new quality of acting is provided by adapting the game layer for the fulfilment of routine tasks. The same is true in the case of creative tasks.

In Western and Eastern cultures, the perceptions of the origin of creativity differ. The Western world stresses the phenomenon of an individual genius, whereas the major part of Eastern civilisations perceives creativity manifestations as a collective phenomenon which does not belong

to the creator himself. Creative activity is not infrequently related to a craft or an inherited family tradition (Sawyer, 2007). It should be noted that the division between the Western and Eastern perceptions of creativity appeared not a very long time ago – only a few centuries ago. Nonetheless, the perception of creativity is not complete, even though quite much is known about the elements that are necessary for productive creative work. A creative product is related to innovativeness and uniqueness. Koh, Nickerson and Basawapatna (2014) investigated a change of students' creativity while creating video games. The authors analysed creativity as the outcome of different original results and used it while modelling the productivity change of creative activity. However, Harnad (2007) states that while analysing creativity, it is difficult to define general qualities which distinguish it from other cognitive categories. What is more, creativity depends on such factors as cultural environment, specificity of the activity and personal attributes (Sternberg, 1988). In the case of collective creativity, it is even more complicated to analyse the phenomenon because of the dimension of social interaction which appears in it. Besides, the forms of creativity can be both overt and covert (Sawyer, 2007), which adds to the difficulty of understanding the phenomenon. Collective creativity is frequently understood through the prism of the science of management as it is closely linked to the creation of new products and implementation of innovations. According to Amabile's (1988, 1997) Componential Model of Organisational Innovation, collective creativity is characterised by three qualities. The first one is expert knowledge of a particular area, the second one is the creative process based on the ability to think innovatively, and the third one is internal motivation to create which is based on internal motivation stimulated by a challenge and the internal feeling of satisfaction. The psychology of gamification is based on similar criteria, thus, if these fields are brought closer, a synergic effect which could support individual and collective creativity through the use of game mechanics is probable. As it has been mentioned before, every game or gamified content is based on immersion, involvement and flow. The latter is the most intriguing in respect to developing individual and collective creativity (Skaržauskienė and Kalinauskas, 2014). The research focusing on the relation between flow and creativity is not numerous. Macdonald, Byrne and Carlton (2006) investigated the relation between flow and creativity in the context of learning music. The authors stated that the conditions of flow made an

impact on the performers' creativity and their works had a higher quality of performance. Barrett (2010) states that the condition of flow maximised students' possibilities to intake information. Another important attribute of flow is the loss of the track of time. Due to this reason, while being in the condition of flow, people spend more time involved in their favourite activity. This feature could be used to stimulate individual and collective creativity because in both cases knowledge base is considered to be one of the most important factors of productive creativity. Due to longer time intervals and bigger knowledge absorption, the gamified environment of the follow-up of creative task progress could act as a catalyst updating the players' knowledge which could serve as the basis for creative production. Besides, the elements of game mechanics seek to involve a person in the world of the game and in this way they stimulate the factors that arouse motivation. While acting in flow, one crosses the boundary of boredom or frustration. What is more, every person perceives a difficulty or boredom in a different way. Due to this particular reason, some people can spend hours and hours in the universe of net roles games, others indulge in narrative-related creations, whereas still others find crosswords and tower defence games, which have no story or elements of co-playing, satisfying. In this case, the modification of the difficulty level and the rise of accidental annoyance or boredom are not negative results if the player is not held on this stage for too long. Such situations are not infrequent while creating even the most expensive games because they are oriented towards a particularly wide range of players. The situation is similar in areas of creative activity. Here, different teams and people of different temperaments are grouped. At some moments, some team members play out or burn out, which is due to a too big challenge or apathy. In a situation like this, teamwork has to be moderated in such a way that the major part of its members were in a creative upswing or flow.

Thus, it can be stated that collective and individual creativity have some differences; however, expert knowledge and motivation to create, both of which are indispensable for the rise of creative ideas, are shared. Gamification stimulates motivation and involvement in task-solving as well as creates conditions of flow, during which the player immerses into the environment of the game world and stores information related to it more intensively. This quality of games could be used to stimulate various forms of creativity and raise productivity of creative activity. However, it is worth mentioning that different types of personalities or players can be

motivated by different elements of game mechanics. In the following part of this chapter, the use of gamification in the context of individual and collective creativity in respect to the types of players will be discussed.

Creativity according to the types of players. In the world of the game, the use of game mechanics produces different outcomes. An attempt to group the players according to certain characteristics has been one of the central fields of game research. In their overview of research in this field, Klug and Schell (2006) state that players can be classified into some categories according to the factors that motivate them or to the rewards for the sake of which they act in the world of the game (Table 30).

Table 30. Players' taxonomy

The title of the player's type	Description
Competitors	Competition is their driving force.
Explorers	Seek to know the world of the game.
Collectors	Seek to gain rare artefacts in the world of the game.
Achievers	The most important is to reach the top of the leaders chart.
Jokers	Seek for social contact, play for fun.
Directors	Seek to dominate in the game, to demonstrate their power.
Storytellers	Like to create (change) narratives of the game.
Performers	Play to show off and impress others.
Craftsmen	Solve crosswords, create systems.

Source: developed by the author after Klug and Schell (2006)

According to Klug and Schell's taxonomy, each player is characterised by a combination of certain attributes; therefore, players who belong to the only type and can be motivated by only one type of attributes are not a common sight in practice. Bartle (1996), whose description of players' types has been popular until nowadays, has a similar opinion. He distinguished achievers who are those players for whom trophies and achievements are important in the game, explorers – those who analyse the world of the game and try to know it better, killers – those who seek to dominate, behave aggressively and create chaos, socialisers – those who seek for a human contact in the game and whose purpose is to communicate. Bartle used his theory for people who play a multi-user dimension role in games. These games did not have graphical user interface, which is common nowadays.

The changes in a team and plot occurred after the introduction of keyboard key code values. However, Bartle did not confirm his statements empirically and did not present clear criteria for players' typology (Orji and Mandryk et al., 2013). Later, Bartle (2003) developed his theory and expanded the players' typology; however, it was of an intuitive nature and was not based on empirical research. Yee (2006) used factor analysis and distinguished three factors that motivate players, including achievement, socialisation and immersion, but he did not analyse people according to their style of playing. Therefore, this typology does not fully disclose the relation between the player's personality and his/her style of playing. The model of players' types called "Brain Hex" is the typology of players based on neurobiological research (Nacke, Bateman and Mandryk, 2011); it distinguishes three types of players (Table 31). This model is interesting as it analyses people's style of playing in relation to their favourite game elements.

Table 31. "Brain Hex" types of players

The title of the player's type	Description
Achievers	Are motivated by long-term goal achievement, collect game artefacts.
Conquerors	Seek to dominate and defeat a stronger rival (-s).
Daredevils	Like speed, risk and adrenaline.
Masterminds	Do crosswords, create optimal game strategies.
Seekers	Like investigating the environment of the game, are driven by curiosity.
Socializers	Like communicating with others and spending time with players whom they trust, but are soon disappointed and feel manipulations from other team members.
Survivors	Like shocking experiences, horror scenes, adrenaline, challenge and danger.

Source: developed by the author after Nacke, Bateman and Mandryk (2011)

Distinguishing the types of players allows choosing certain attributes of game mechanics that have a bigger impact on motivation. For example, according to Brain Hex typology, the means of mechanics that will suit the achiever the most will be related to external stimuli (points, leader charts, unique trophies, etc.), daredevils or survivors will be more motivated by a complex design and design of original levels, whereas conquerors will expect an intensive curve of difficulty and a strong feedback after defeating an enemy, and the like. However, in the case of gamification, the types of

players do not always reflect the real situation. Bartle (2003) stresses that players can change their style of playing depending on the situation and on the number of players attributed to other types. Moreover, gamification as a method of stimulating motivation is not always based on a narrative which is important to some players. The adaptation of the game layer to non-gamified contexts also requires an easier form of involvement than playing entertainment games. Besides, the method of gamification can be directed towards people who generally do not play video games; therefore, attributing them to one or another type of players is questionable.

Collective creative activity is frequently a complex process predetermined by several circumstances. It is related to the search of new ways of problem-solving or new problems existing outside one's comfort zone. The question of how to adapt elements of game mechanics to personal attributes of the people who have few links with the game culture is still relevant not only in the case of individual and collective creativity, but also in the context of other areas. At this point, it could be possible to rely on Ferro, Walz and Greuter's (2013) theoretical concept of the relationship between the types of players and personality types. The authors juxtaposed the best-known theories of establishing psychological personality types with the qualities of players and created generalised personality/player types that fell into five categories (Table 32). The authors stress that this model requires empirical confirmation; however, the juxtaposition of psychological personality characteristics with the players' strategies is one of the methods to find a suitable balance of elements of game mechanics stimulating motivation for people who do not play video games and cannot attribute themselves to the types of players described above.

Table 32. Typology of players'personalities

The title of the player	Description
Dominants	Seek to be seen in different ways, egoistic and self-confident.
Objectivists	Seek acknowledgement through their intellect and knowledge. Are not egoists by nature, but their interests are more important than other people's interests.
Humanists	Social relation is important for them. They prefer solving other people's problems rather than their own. Are interested in those who communicate with them more than in the place of action in general.

Inquisitives	Analyse how processes and objects work. Self-realize in a non-standard way, give preference to open worlds, not to spaces restricted by rules.
Creators	Experiment with objects from the surrounding world, try to find new theories and use them as a pole star for further cognition.

Source: developed by the author after Ferro, Walz and Greuter (2013)

Perspectives of creativity development through gamification. Seeking to find an optimal variant of the use of game mechanics in creative activity, a three step methodology can be used. The first step includes establishing the type of players according to one of Ferro, Walz and Greuter's theories. The second step covers juxtaposing the personality type with the player's characteristics. The third step includes adapting a set of elements of game mechanics to achieve a higher level of immersion and involvement in creative activity while stimulating the condition of flow. The presented sequence of actions is not without shortcomings. Firstly, there is lack of empirical research investigating the impact of the condition of flow on creativity. Secondly, Ferro, Walz and Greuter's model is theoretical; therefore, the use of elements of game mechanics for different personality types is limited.

In the future, the impact of gamification on the phenomenon of individual and collective creativity should be investigated in depth with a particular emphasis on the impact of the condition of flow on knowledge development and on the motivation to engage in creative activities. It is also worthwhile to investigate the juxtaposition of personality types established in line with different psychology theories with the results of tests establishing players' types. If the results in relation to Ferro, Walz and Greuter's theory were positive, it would be reasonable to construct gamification scenarios in accordance with the needs of individual creators or groups of creators, adapting the most motivating elements of game mechanics in the context of stimulating creative productivity.

The present knowledge about the impact of game mechanics on creative problem-solving is rather limited. On the other hand, there exist practical examples that confirm the theoretical relation between creativity and gamification in particular with respect to the collective form of the phenomenon which, in this case, is understood through the prism of collective wisdom. "Play to Cure: Genes in Space" is one of the examples illustrating how a numerous community of players can help to fight

against cancer by playing a hang-glider arcade type of game. During the game, the players glide in space and collect valuable space dust and at the same time identify negative elements in real genetic data. Scientists spend hours and hours to carry out the process; however, if there is a big number of players, such a task becomes a problem which takes just a few minutes to be solved. The game "Foldit" is a protein folding game, which helped to disclose the structure of enzymes causing a disease similar to AIDS in monkeys' organisms. Researchers had been trying to solve this problem for 13 years, whereas the players solved it in only three weeks. The game "Planet Hunters" helped to find over forty planets that could be suitable for life. "Galaxy Zoo" allows looking for similarities in galaxies and classifying them according to their type and origin and, thus, creating a huge bank of collective knowledge. These are just a few examples of the existing projects that aim at invoking the players' potential for solving real problems through collective games. The brilliance of this concept lies in the fact that people participating in the creative process do not necessarily know what important goal they are making a contribution to. Thus, it is likely that it will not take too long for the day to come when games that had been previously considered to be childish entertainment and a careless form of wasting one's time will with the help of virtual worlds be saving thousands of lives by joining the players' creative potential.

5.2.3. The Playful City: Using Play and Games to Foster Citizen Participation

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Introduction: the playful smart city. Since several decades, the relationship between technology, creativity and city life has been an intimate one. Following "creative city" policies popular in the late 1990s and early 2000s, "smart city" business, policy and design visions have gained considerable traction since the middle of the 2000s. Smart city agendas aim to improve services and liveability through ICTs and supporting infrastructures, such as urban labs, and rapidly gain foothold in cities worldwide. Large tech companies, such as IBM, HP, CISCO, Microsoft, etc., are forming smart city coalitions with municipalities and knowledge institutions. Among the issues that smart city policies seek to address are

mobility, clean energy, water and food production and distribution, health, living and public participation (Hollands, 2008). However, among cities, such as Rio de Janeiro, Barcelona, Amsterdam, Masdar and Songdo, the emphasis and actual implementation of smart city visions hugely differ.

Smart city visions have received wide criticism (see, for example, Greenfield, 2013; Hemment and Townsend, 2013). By and large, these criticisms have focussed on the ill-defined notion of "smartness" in smart city visions, targeted the simplified view of what cities actually are and attacked their a-political technocratic nature. What does "smart" mean and who are actually supposed to be smart? Is city life and the urban experience about control, efficiency and predictability, or about encountering the unexpected and dealing with differences? Moreover, smart city views propose "technological fixes" to complex problems. Many so-called "smart technologies" or smart interventions are implicitly driven by logics of consumption, control and capsularization but do not empower citizens to become active players in their cities (de Lange and de Waal, 2013). The push for safety with CCTV and smart risk assessing algorithms turn cities into places of pervasive control and surveillance. Smart retails solutions, location-based services and predictive algorithms push a consumerist view of urban life. Also, personal mobile technologies foster a culture of capsularization and retreat. When technology-driven solutions ignore active contributions of citizens, they may have adverse effects for urban public life and identities at large.

Alternative notions have been proposed to address these asserted shortcomings, which, among others, are the "playable city" and "playful city"[241]. In these people-centered views, the issue at stake is how to engage "smart citizens" with their urban environment and each other with the aid of play and games. In this chapter, the author further explores this nascent research and design agenda that connects the world of urban research and design to the world of research and design of play and games. The aim is to contribute to debates about smart cities and smart citizenship through the particular lens of play and games, to provide a typology for analyzing and developing the playful city and to reflect on the strengths and weaknesses of this idea.

[241] See, for example, the *Playable City* program and conference at Bristol's Watershed <http://www.watershed.co.uk/playablecity>; or the *Playful City* workshop held in Amsterdam in 2014 <http://www.hetnieuweinstituut.nl/en/international/partner-programmes/asem-international-networking-programme/creative-skills-playful>.

Play and the city: a historical overview. To gain a firmer grasp of play and games as ways to engage people in participatory city making, it is fruitful to trace some historical connections between play and the city. In various ways, play and games have been part and parcel of urban theory and practices since ancient times (see also de Lange, 2009). From Roman "bread and games" (*panem et circenses*) to the present "experience economy" (Pine and Gilmore, 1999), cities have long been conceived as centers of entertainment and fun. The city in this view is the locus for actual playful behavior and activities, and for enjoying games or other forms of entertainment. Second, with the rise of the modern metropolis, people's behaviors and attitudes in public space have come to be understood in playful terms through the use of theatrical metaphors. Theorists, such as Simmel, Goffman and Lofland, argued that urbanites engage in continuous role-playing and information games to deal with life among strangers who meet in highly segmented roles (Simmel, 1997; Goffman, 1959; Lofland, 1973). Third, a historical strand of "ludic architecture" connects play and games to the physical form of the city. After the Second World War, Dutch architect Aldo van Eyck dotted the ruined cityscapes in the Netherlands with outdoor play spaces as a way to counter top-down functionalist planning policies and open up room for people's own creativity (Oudenampsen, 2013). If this historical line connects play to education, civilization and *Bildung* ideals, a related yet distinct fourth strand as about play as downright subversive. The Situationists criticized mass consumer society and sought to reclaim the right to the city through subversive counter-play and everyday spatial tactics, such as *dérive* and *detournement* (Debord, 1955, 1958, 2005; De Certeau, 1984). Recent approaches in the same tradition have focused on subcultural or countercultural urban practices, such as skateboarding or *parkours* (Borden, 2001; Mould, 2009). Fifth, while not strictly playful, key notions from the world of informatics, such as networks, simulation, feedback loops and virtual reality, have come to profoundly influence architectural theory and practice as new ways to imagine, represent and design cities with digital tools (see, for instance, Wigley, 2001; Picon, 2008). Cybernetics and systems theory have been very influential ways of understanding the city as emergent rule-based systems, which can be "played" through creative recombinations and generative, algorithmic, responsive or parametric design (see, for example, Berry, 1964; Beesley

and Khan, 2009). Finally, in late capitalism, play has been absorbed by work itself, through the conflation of labor and leisure time and the concomitant ethics of the creative class, hacker ethic, etc. (Rifkin, 2000; Florida, 2002; Himanen, 2001; Scholz, 2013; Fortunati, 2015).

From this extremely compressed overview, several insights can be distilled. Historical conceptions of the "playful city" have existed on multiple levels and in various forms, across spatial, social and mental spheres of urban life. In the majority of these views, there is a clear conception of "smartness" involved in play. However, it is a rather different view of smartness: didactic and self-empowering in Van Eyck's urban playgrounds, shrewd subversiveness in Situationism's playful tactics, cleverness and self-confidence in playing information games in role-playing, and of almost demiurgic ambition in parametric design. Note that in some other historical strands sketched above play is equated with mere entertainment and implicitly taken as childish, stupefying or opium for the masses. Another point is that in early modern times the realms of play and everyday life became separated. More recently, they have been (again) understood as inextricably intertwined. This has been largely driven by the advent of digital technologies in the urban realm and the presumed link to creativity and smartness. A final point is that there are salient differences in play and between play and games itself. Following the work of Roger Caillois, several play activities are distinguished, such as competition, chance, pretense and sensory stimulation (Caillois, 2001). In addition, Caillois noted that play attitudes may alternate between spontaneous and intrinsically motivated free play (*paidia*) to rule-based and goal-oriented gaming (*ludus*).

In game design too, the city has often been a central source of inspiration. Alternately called pervasive/ubiquitous/location-based mobile/hybrid reality/alternate reality/urban games, a whole genre of games frames the city as a playing board in order to escape the confines of the screen and be played in hybrid physical-digital spaces (de Souza e Silva, 2006; Chang and Goodman, 2006; Montola, Stenros and Waern, 2009; de Souza e Silva and Sutko, 2009). Cities also frequently figure in game design. This may range from representations of particular cities in the US in the GTA series, to simulating the complexities of city-making in SimCity, to playing with the future of a smart city gone rogue in Ubisoft's Watchdogs. In this chapter, we focus on the question how game designers, artists and architects

have been developing games that center on specific urban problems, and create play experiences that connect people to life in the city and to fellow urbanites. This is a relatively recent area of expertise that connects urban design with developments in the world of game design. Designing games that are not just played for their entertainment value but also for serious purposes is known under such labels as serious games, games for change, applied games, gamification, persuasive games, etc. The differences between these notions will not be discussed here. It suffices to note that while the use of games and play elements to help solve problems appears promising, a careful balance must be struck between simulating "real world" complexity and deliberate simplification, and between leveraging people's intrinsic play motivations and achieving external goals.

Levelling city play. Play and games may foster participation and citizen-driven innovation on various levels. In this analysis, the author will move from the most applied level of using games for actual urban design to playful experiences without any immediate utilitarian purpose.

First, games may be used to engage people in the actual planning and design process itself through simulation, feedback and using outcomes in actual design. An early example from the Netherlands is *Baas op Zuid* (www.baasopzuid.nl, 2002), a project by BBVH architects in collaboration with housing corporations. The online simulation game was used for the redevelopment of two old neighbourhoods in the city of Rotterdam. Players had to make decisions about their neighbourhood. With a limited budget, would they choose more green spaces, more parking spots or more playgrounds? Players immediately could see the consequences of their choices. Outcomes were aggregated and sent to the planners. Not only did this inform the actual design and decision-making process, but inhabitants also acquired a better understanding of stakeholder deliberations in complex trajectories of city rejuvenation. People who normally would not attend a town hall meeting now had a chance to speak up. Still, in this case the professional remained the initiator and there was no far-reaching shift in the relationship between expert and amateur. Moreover, there was no true gameplay involved, except for the immediate multi-sensory feedback on decisions made (for example, seeing less coins or hearing traffic noise).

Second, games allow people to act on a wide range of specific urban issues through role-playing, building trust, forging collaborations and tapping into crowd creativity. An example is *Community PlanIt* (http://

engagementgamelab.org/projects/community-planit, 2011) by Eric Gordon and team (Gordon and Koo, 2008; Gordon, Schirra and Hollander, 2011). Players answer questions and complete missions to earn virtual coins that they can pledge to real-world urban planning causes. Players also earn awards, including bonus coins by participating in in-game deliberations. Through this game, citizens, municipality and other stakeholders take up different yet equivalent roles and collectively try to solve problems. Through team cooperation, these games build trust, which helps to overcome the tension between short and long term interests. Citizens now have become actual agenda-setters and problem-solvers.

Another project from the Netherlands is *Rezone the game* (de Lange, 2013). Two cultural organizations from the city of Den Bosch, together with a university for applied science's game design program, developed a game hybrid board/screen game. *Rezone* consists of a physical board game with 3D printed iconic buildings that represent the neighborhood, an augmented reality layer of real-time information about these buildings projected on a screen, and a computer algorithm programmed to let vacancy spread like a virus around already empty buildings. Players have to salvage real estate from decline by making strategic investments and forging collaborations. Participants adopt one out of four possible stakeholder roles. In the case of vacancy, these roles include proprietor (owner of real estate), mayor (representing the municipality), engineer (urban designer) and citizen (neighbors). The challenge is for players to not just pursue individual self-interest, but to strategically collaborate in order to defeat the system, which is programmed to let the city descend into decay. In a time in which architecture is under pressure – financially, but also with regard to the legitimacy of professional expertise – it is important that new processes are developed that allow citizens to become shared owners of the processes and outcomes of urban interventions. *Rezone* is an attempt to establish this sense of ownership through intrinsically motivated play and contribute to livable and lively cities. Like most other games, *Rezone* is a radical simplification of a complex issue. *Rezone* itself does not provide solutions. What it can do is to put an issue on the agenda, convene various stakeholders around an issue and allow them to discover horizons for action for themselves. When people craft their own solutions, they will have a much stronger sense of ownership over the outcomes. Already one of the largest construction and real estate companies in the Netherlands has shown interest.

Third, games are used to stimulate playful encounters and interactions with other people and places by stimulating serendipity and fun. In *Koppelkiek* (www.koppelkiek.nl, 2009), by social game maker Kars Alfrink, players in a troublesome neighborhood in Utrecht had to execute simple missions by taking a snapshot of oneself, for example, together with someone else and a randomly found number. These pictures where publicly shown in the window of a neighborhood center and acted as a conversation piece between neighbors. This game was explicitly created to promote playful interactions and serendipity. Players were invited to drop their usual defense mechanism and open themselves up. The game, thus, helped to cement social cohesion and trust between neighbors, and re-engage with the urban environment.

Fourth, games are used to foster a "sense of place", a feeling of belonging and care for the city through emotionally powerful play experiences. An example is the "subtlemob" project *As If It Were the Last Time* (http://wearecircumstance.com/as-if-it-were-the-last-time.html, 2009) by artist Duncan Speakman, in which participants underwent a cinematographic experience in the streets of London. Participants downloaded an mp3 track and received a secret location and time to start the track on a portable audio player. They were divided into two teams. One team received instructions to perform a minimal scene, while the other group listened to a soundtrack and voice-over and became the audience of a filmic scene performed out on the streets. This hardly qualifies as a game, yet it creates a shared playful experience and induces a sense of connectedness. Through a minimal intervention, participants themselves turn the everyday into a magical situation. Playfulness here stimulates affective responses and emotional ties.

These examples are about applying games or play experiences to the urban realm to foster the "playful city". The reverse also happens: the city itself can be made "playable" in different ways (on the notion of playability, see, for instance, Kücklich, 2004). Two levels can be distinguished: the *procedural* level of designing certain playable urban infrastructures and services, and the *conditional* level of opening up existing urban policies for experiments and creative "smart governance". At the procedural level, city infrastructures and services (e.g., traffic speed meters, public transport staircases) can be made interactive and gamified to stimulate certain behavior and mentality. A well-known example is the subway staircase turned into a giant live piano as a way to seduce travelers to climb the stairs

instead of taking the escalator[242]. At the level of urban governance, there are numerous experiments that aim to open up the city to systemic change by its inhabitants. Innovations in "playing with the rules" and "leveling the playing field" include participatory budgeting, liquid politics, opening data repositories, and urban labs for semi-autonomous innovation. It is important to note the subtle but salient difference between the "playful city", taken here as the city in which play and games stimulate the smartness of citizens, and the "playable city", taken here as the city that itself becomes smart at infrastructural and institutional levels.

Conclusion: the playful smart citizen. In summary, some provisional lessons that could influence how we think about, study and design the smart city are formulated. From the brief historical excavation of the relationship between play and the city, it has been shown how "smartness" in play is understood in a variety of ways. The author suggests that thinking and working along the lines of the "playful city" open up a host of ways to conceive "smartness", instead of just a technologically-driven one. If we want citizens to be smart alongside cities, we need to better understand how people are already smart in a multitude of ways and how we could leverage this to make better and more interesting cities. Also, from this overview, an important consideration has arisen with a more critic's dimension. Play risks becoming absorbed into goal-oriented utilitarian practices and neoliberal and self-disciplining discourses of labor as play. While this has not received much attention here, this should be born in mind when further studying and design the playful city.

From the analysis of the mentioned examples, it has been seen that stakeholders while playing meet in a joyous atmosphere, instead of intense town hall meetings or around the negotiation table. Playing together allows trustful relationships to form, which allows forging new social ties or solidifying existing ones. Play in itself probably is not enough to solve urban problems, such as vacancy or the lack of ownership and social cohesion. Playing together, however, may act as a catalyst. From the analysis, it has also become clear that urban design no longer is the exclusive domain of architects and planners. Game makers, media artists and app developers too are designers of today's cities across physical, social and experiential ranges. Cities face ever more complex issues. This requires smart strategies to tap

[242] *Piano Staircase* [interactive]. <www.thefuntheory.com>. The notion of gamification has been hotly debated; see, for instance, Deterding, 2011.

into the pool of citizen wisdom and participation. Games and play seem great ways to do so. However, this requires planners to relinquish control, accept uncertain and ambiguous outcomes, and to allow failure to possibly occur.

Games are ontologically ambiguous: they are composed of a set of constitutive rules, a material setting, and actualized through the embodied activities of the players. This is comparable to what architects may recognize as program, design and use, but with a twist. Game designers create rules and settings, yet the game is only actualized by actual players. People playing are not merely end users. They are active participants. They frequently engage in active production and "meta-play", playing with the (rules of) the game itself. Players subvert original rules, hack, cheat, exchange game tips, create derivatives and tell stories about their own play. According to Dutch historian Johan Huizinga, author of the seminal work *Homo ludens* from 1938, play is not an element in culture, but at the origin of culture (Huizinga, 1955). Play generates culture because it provides room for innovation. Play offers a safe space for experiment and collaborations in which failing does not immediately have grave consequences. Huizinga's observation that culture emerges from play suggests that these various play interventions discussed above may contribute to a new urban planning culture in particular and participatory urban culture at large (van Westrenen, 2011; de Lange, 2013; de Lange, van Boxmeer and Peters, 2014). Playful citizens then are not passive users of their city, but adopt a more active role as co-creators of their environments or "city hackers". This way a sense of ownership can arise (de Lange and de Waal, 2012, 2013). Instead of leaving it up to governments, corporations and (design) professionals, citizens in the playful city create their own smart urban culture.

5.3. Experimental Application of the CI Potential Index Methodology

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5.3.1. The Course and Methodology of the Experiment

To analyse the hypotheses on peculiarities and preconditions for CI development, a scientific experiment was launched alongside with the

quantitative and qualitative research (more about the research methodology in chapter 3.1.). As all the projects are unique, a possibility to have a control group and experimental groups with identical features was absent and, therefore, quasi-experimental research methods were invoked. The experiment has been conducted in 2 stages. The first stage was exploratory. The researchers used certain criteria to compile a list of online communities (the list was revised on the basis of the data collected during quantitative and qualitative interviews) and observe projects practically implemented by virtual communities. The chosen subjects were observed in accordance with the designed survey scheme (representative parameters) and the collected data underwent qualitative analysis and summarizes to make corresponding conclusions (more on the results in chapter 4.1.). At the onset of the experiment, the researchers conducted a natural experiment with no direct interference into activities of the researched online community in order to avoid outside influence and its effects. On completion of the initial stage, a selection of projects for further monitoring was carried out and CI criteria were adjusted.

The second stage of the experiment was an integral development of CI Potential Index. After the conceptual framework of CI Potential Index was developed (see chapter 5.2), the experiment continued to empirically evaluate CI potential in selected online communities. Apart from monitoring the communities, the stage incorporated negotiations with platform developers and administrators to get access to specific *web analytics* data. In final research stage, the system dynamics model, introduced in chapter 6, laid down methodological grounds for monitoring interrelations between individual CI components and analysis of the online community as a CI system.

The indicators determined in the theoretical part and adjusted in the course of quantitative and qualitative research were used to collect data characterizing dimensions and components of CI intelligence. As in the initial stage, the methodology for CI Potential Index calculation was adjusted and improved on the basis of experience and results obtained from the experiment.

During the *second stage* of the experiment, the set of the observed subjects (online communities) was narrowed on the basis of the following criteria:

– adequacy to the project objectives;

- viability, communities producing no actual activities were excluded from the scope of the research;
- a relevant level of differentiation and diversity of sectors and community missions;
- comparability in the general context (i.e., all communities are of the size and activeness that allow their comparison and drawing general conclusions with no distortions of results). On estimations of the results of the exploratory experiment, research in oversized communities (e.g., civic media or student-teacher communities) and where the project involves a scarce number of participants was abandoned;
- community independence (some virtual projects are only parts of bigger projects or institutional activities and the research subject is impossible to distinguish from the general system, e.g., the problem identification system of Vilnius municipality would make a suitable monitoring subject as to the nature of its activities, but the data would associate with activities of a single municipality and produce distortions in the results. Meanwhile, "Transparency International" has clearly distinguished their initiative on corruption prevention and, therefore, their project was included into the monitoring list).

As the list of monitored subjects was reduced in accordance with the aforementioned criteria and the data of the exploratory research was analysed, adjustment of indicator measurement scales took place.

The present empirical study was limited to Lithuanian projects oriented towards tackling of local, national or even global social issues, as content of such projects is usually available publically. Representative parameters of the framework were observed in 15 socially-oriented online communities. Observation instrument encompass different types of criteria based on numeric, binary and qualitative data. The majority of numeric criteria were adapted from Resources and Tools for Evaluation of Online Communities of Practice (U.S. Department of Education Office of Educational Technology, 2011); while qualitative and binary criteria are either retrieved from literature sources analysed in other chapters of this book or developed by the authors. Table 33 presents monitoring techniques, including criteria for observation, type and predicted availability of data.

Table 33. Instrument for evaluation of CI Potential in online community projects

Index	Dimension	Monitoring indicators	Type and availability of data
Capacity index	Capacity for creativity	Total visits (number of times the web-site has been accessed or visited); unique visitors (number of different visitors the community has had); repeated visitors (number or proportion of visitors who have visited the web-site more than once (ever, or over some period of time)); total number of messages posted (all forms of messaging, including forums, blog comments, video comments, etc.); average page views per visit.	Numeric data. Web-site administrators could retrieve precise data. Availability of data for external users is limited.
		Degree of participants (agents, members) diversity (demography, gender, nationalities); degree of motivation, involvement of group members; degree of freedom and security to offer idea (anonymity versus identification).	Qualitative data. Could be retrieved from surveys or applied subjective evaluation.
	Capacity for aggregating knowledge	Number of registered participants/members; average time per visit or session; top and total referrers; total number of topics created.	Numeric data. Exact data are available for web-site administrators and generalized data – for the public.
		Degree of accessibility; longevity; recognition.	Qualitative data. Could be retrieved from surveys or applied subjective evaluation.
	Capacity for decision-making and problem-solving	Total participation in site polls and surveys (number of respondents/voters); number of ideas for voting.	Numeric data. Exact data are available for web-site administrators and generalized data – for the public.
		Maturity of task formulation; diversity of created knowledge/products; quality of created knowledge/products.	Qualitative data. Could be retrieved from surveys or applied subjective evaluation.
Emergence index	Level of self-organization	Design of structure (hierarchy, team work, leadership); group work activity; quality of discussions/level of criticism.	
	Intensity of emergence resulting in activities	Depth of problem analysis; variety of problem-solving alternatives; reality of problem-solving alternatives.	

	Level of adaptivity	Number of "sharing" activities ("share on Facebook" or other) of community content by community members; conversion rate (the percentage of unique visitors who become registered members over a period of time).	Numeric data. Exact data are available for web-site administrators and generalized data – for the public.
Social Technology Index	External and internal networking/ collaboration technologies	In-bound links (tracking using standard site analytic tools like Google Analytics), Bounce and exit rates – Bounce rates tell leaders how many participants come to their site and exit after viewing only a single page. Exit rates tell how many participants leave the site after visiting a particular page.	Numeric data. Available for both the public and web-site administrators.
		Existence of mechanism for anonymous offering of ideas; existence of synchronous and asynchronous chat tools, open forums, etc. Provided access and integrated service to all devices (handhold, PCs, etc.).	Binary data (Yes/No). Available for both the public and web-site administrators.
	Privacy and security assurance technologies	Existence of mechanism for providing secure and legal activities, protection of personal data; existence of mechanism of message control.	
	Decision making technologies	Existence of mechanism for collective brainstorming; existence of mechanism to vote/rank idea/solution; existence of mechanism to make decision or conclusions.	
	Sharing/creating knowledge technologies	Existence of mechanism to add value to content; existence of mechanism to generate feedback; existence of technological solutions for knowledge visualisation and organisation; existence of mechanism for idea classification; existence of mechanism for mass argumentation; existence of mechanism to create interests groups.	
	Media/design quality	Degree of user friendliness, speed and convenience; quality of visualisation; level of development possibilities; design relation to task.	Qualitative data. Could be retrieved from surveys or applied subjective evaluation.
	Data aggregation and data access technologies	Existence of mechanism to collect data; existence of mechanism to evaluate and analyse performance; existence of mechanism to share and re-use the data; the perpetual beta (updating possibilities).	Binary data (Yes/No). Available for web-site administrators.

The first stage of observation included pre-testing procedure aimed at selection of online community projects for further research. 19 units from Lithuanian virtual medium that corresponded to the requirement to be oriented on solving social issues were selected:

- *Lietuva 2.0 (Lithuania 2.0) (https://www.lietuva2.lt/lt);*
- *Aš Lietuvai (I for Lithuania) (http://www.aslietuvai.org/lt/i-top/atnaujinimai2014);*
- *Kelk bures (Hoist sail) (http://www.kelkbures.lt/);*
- *Kas vyksta Kaune (What happens in Kaunas) (http://kaunas.kasvyksta.lt/);*
- *Kam to reikia (Why it is needed) (http://www.kamtoreikia.lt/);*
- *Ututi (www.ututi.com);*
- *Smart & Green city (http://www.smartandgreencity.com/);*
- *Žalias miestas (Green city) (www.sodinkim.lt);*
- *Skaidrumo linija (Transparency line) (http://www.skaidrumolinija.lt/);*
- *Santalka (http://santalka.lt.tst.bernardinai.lt/);*
- *Miesto problemos (City problems) (http://www.vilnius.lt/lit/Miesto_problemos);*
- *Minčių sodas (Garden of thoughts) (http://www.ms.lt/sodas/);*
- *Hub Vilnius (www.HubVilnius.lt);*
- *Laisvasis universitetas (Free university) (www.luni.lt);*
- *Viešai (In public) (www.viesai.lt);*
- *Pincetas (Pincette) (http://www.pincetas.lt/);*
- *Antakalnio bendruomenė (Antakalnis community) (http://www.antakalnietis.lt);*
- *Socialinis verslas (Social enterprise) (http://www.socialinisverslas.lt/);*
- *Mes darom (We act) (http://www.mesdarom.lt/).*

However, after preliminary analysis four of the aforementioned virtual projects were removed from consideration, because in three of them (*Smart & Green city, Santalka and Garden of thoughts*) no activity was observed in past several years. Consequently, sixteen socially-oriented virtual projects passed to the first stage of observation process.

The main limitation of the first stage of the evaluation procedure was that accurate numeric data available only for web-site administrators could not be retrieved. Not all administrators were ready to provide data necessary for research. Therefore, qualitative and binary information was gathered and in some cases – possibly imprecise numeric data. However,

at this stage of research, such organization of testing is satisfactory as further validation of CI Potential Index will be continued in the future by collecting scientific evidence in the scientific virtual environment. The following is a brief report on evaluation results (more on the results of the exploratory stage of the experiment in chapter 4.1).

5.3.2. Results of the Exploratory Research

CI Capacity Index. When observing capacity for creativity, capacity for aggregating, knowledge and capacity for decision-making, accurate numeric data (e.g., number of visits, average time per visit or session) are not available for researchers. Only approximate data can be retrieved from announcements posted by web-sites administrators. When measuring a degree of participants' diversity, in the majority of monitored virtual projects demographic, gender and geographic diversity could be evaluated as high. However, only Lithuanian speakers are engaged in monitored online communities. Therefore, national diversity is relatively low. The measurement of motivation degree and involvement of group members is rather subjective. However, when observing user's activity and contents, it is obvious that community members in some of the projects are more motivated than in others. In this regard, the community of Lithuania 2.0 differs from the rest with the variety, depth and creativity of activities demonstrating a higher level of motivation and involvement of group members. The degree of freedom and security to offer idea is related to the issue of anonymity versus identification. Half of observed online communities propose both anonymous and registered participation in activities, where everybody can surf the website, while only registered users are able to propose ideas, vote and/or discuss on posted ideas. Some of the communities allow participation only for registered user's probably limiting capacity for creativity and diminishing knowledge aggregation and fusion. In addition, there are few online communities ensuring total anonymity taking a risk that group members do not take responsibility for their activities consequently reducing plausibility of created contents. Maturity of task formulation, diversity and quality of created knowledge/products depends on ambitions of online communities and is maintained by users' voting and evaluation mechanisms. Therefore, virtual projects with broad goals to tackle societal problems demonstrate a wider variety

of ideas, more mature discussions and higher quality solutions than those with a narrower focus.

CI Emergence Index. Analysing the level of self-organizations, the performance of the majority of observed communities depends on the balance between leadership and teamwork. During a discussion on specific topic, people having an interest in this issue join into groups and elect a leader. The more active user is, the more rights in the network he/she gains. In this way, communities maintain a high level of self-organization in networks. Quality of discussions and level of criticism as well as depth of problem analysis, variety and reality of problem-solving alternatives are of higher importance in projects that have a wider outlook towards social problems. Among the most standout projects, attributing aforementioned criteria is *Lithuania 2.0*, which worked or still works on 260 initiatives. An important indicator demonstrating strength of community members" inclusion into network activities is the percentage of unique visitors who become registered members over a period of time. However, this data is available for website administrators only.

Social Maturity Index. The basic indicators demonstrating social motivation of virtual project are mission and vision. All observed online communities strive to contribute to the development of e-democracy to various extents. The most ambitious mission is formulated for Lithuania 2.0 members. It challenges the community to create Lithuania in the way participants want it to be. Consequently, the contents and organization of network activities are the most sophisticated among the other reviewed projects. Values and rules are usually set in diverse forms (manifests, users' requirements, privacy guidelines). During the enrolment to the network, individuals accept to follow rules of activities in the community. On such agreement, the trust among network members is built in the majority of communities. Diversity in cooperating partners for the development of social projects demonstrates a potential impact on society. Some of the observed communities do not strive to attract other members, while there are some projects oriented towards linking industrial partners, governmental, non-profit organisations and informal groups. All online communities demonstrate a high speed of reaction to social issues as topics covered deal with topical issues on local, national or even global level. Researchers could not identify influence of online community on governance or assess the

number of implemented ideas/projects. Only several online communities publish the data on implemented actions and initiatives. However, the majority of the results are named as publications or implemented ideas improving performance of online community. No successful projects, which influenced real changes in public policy, have been reported yet.

Social Technology Index. Technologies are supporting mechanisms for effective and efficient activities of online communities. The essential technological means determining existence and development of online community are availability of techniques for providing secure and legal activities, protection of personal data, message control. The observed websites match diverse mechanisms for privacy and security assurance, including self (user) control, administrative control, user agreement and privacy policy, publication of national data protection inspectorate issued permit. The number and variety of online activity tools differ depending on objectives of the community. Consequently, if some community limited its activity to selection and aggregation of knowledge and withdrew from mass deliberation and/or decision-making, the website would not include mechanisms for collective brainstorming, mass argumentation, voting/ranking, etc.

5.3.3. Results of Experimental Application of CI Potential Index Methodology

On evaluation of the adequacy of the observed subjects to the set criteria, a new list of online communities to be analyzed was compiled. The list includes communities that, as the exploratory observation revealed, meet the project objectives, have a relevant level of vitality, ensure differentiation and diversity of the general monitoring list, are independent and comparable among themselves. The list was complemented by several new communities that were absent in the list of the exploratory observation in order to compile a list of at least 10 online social communities. When the project *Aš Lietuvai* (http://www.aslietuvai.org/) proved to be in the state where information is available only to a restricted number of internal users, further research in the project was abandoned as impossible to carry out with no direct interference in the company's activities. The following social communities were studied:

- *Lithuania 2.0 (https://www.lietuva2.lt/), GŽ;*
- *Darom (http://mesdarom.lt/), GŽ;*

- *Transparency line (http://www.skaidrumolinija.lt/), GŽ;*
- *Global Lithuanian Leaders (http://www.lithuanianleaders.org/), GŽ;*
- *Lithuania's association of young scientists (www.ljms.lt), GŽ;*
- *Collective cooperation (http://www.kooperuokimes.lt/), GŽ;*
- *Sail (http://www.kelkbures.lt/), GŽ;*
- *Independent University (http://luni.lt/), N;*
- *Hub Vilnius (http://hubvilnius.lt/), NŽ;*
- *Antakalnis community (http://www.antakalnietis.lt/antakalnis/), NŽ;*
- *Technarium (http://www.technariumas.lt/), N (has an alternative).*

(G – included into Google Analytics, Ž – is mapped, N – absent in Google Analytics).

The exploratory research along with the further analysis of scientific sources and qualitative research has revealed drawbacks of the monitoring tool and its application. As the exploratory research revealed that the collection of numeric data is complex and not always possible, the research instrument has been adjusted by introducing tools for qualitative measurement of numeric indicators. Also, a conclusion that measurement of CI social maturity dimension needs broader scientific research, including sociological polls and interviewing of the representative of relevant national institutions, has been arrived at. Observation of intrinsic community processes alone is insufficient to credibly evaluate community's social maturity. Therefore, a decision not to evaluate social maturity dimension within the scope of the present research has been made as a limitation of the research. The following paragraphs introduce calculation methodology for CI Capacity and CI Emergence indexes.

Dimension of the Capacity Index. The dimension of CI Capacity Index comprises 3 major components: capacity for creativity, capacity for knowledge aggregation and capacity for decision-making and problem solution.

Measurement of each of the three components is based on at least two integrated indicators formulated on the basis of at least one quantitative or qualitative criterion. To ensure uniform interpretation of the criteria used in estimations of elements of community activities by all monitoring researchers, each criterion was standardized with reference to data collection and evaluation. As the later CI research stages are to develop the CI monitoring methodology adapted for virtual

scientific environment, the instrument has been constructed having in mind that methodology is likely to be used not only by researchers, but by community initiators, as well. Such circumstance means that along with qualitative criteria for subjective evaluation, the monitoring instrument has to include quantitative criteria, assessment of which is based on the quantitative data available to community initiators and not to researchers. As researchers had limited access to primary quantitative data of online communities, the monitoring was conducted by means of qualitative evaluation.

The following paragraphs describe summarized data of the key observation sorted in accordance with dimensions of each composite index (CI Capacity and CI Emergence). To carry out the measurements, a table containing respective components and indicators characterized by corresponding criteria and their measurement rules has been compiled for each of the dimensions. The table also includes numeric results of the assessment and textual descriptions of the most frequent and/or prominent features of community activities. To safeguard anonymity of the researched communities, the actual names of the communities were not included in the analysis.

Review of the Capacity for Creativity Evaluation Results. The capacity for creativity dimension comprises two integrated components: the degree of diversity in the sources of ideas (measured by two assessment criteria) and diversity of the forms of participant inclusion (measured by three assessment criteria) (see Table 33). The indicator of the degree of diversity in the sources of ideas reflects diversity of project participants in terms of gender, age and nationality. The experiment results reveal that all observed subjects had no restrictions on community member's gender. However, the vast majority of the communities use the Lithuanian language – a limitation of diversity of national origin. Some communities are predominated by members of certain age groups although allow participation with no restrictions as to the age. Presumably, such domination is caused by the complexity of the problems addressed by communities as the major part of their participants is from 25 to 34 years old, i.e., the most socially active age group. One of the communities imposes limits upon professional occupation, job experience and extension of international experience of their participants granting full membership only to those who meet certain criteria in the aforementioned fields.

The level of diversity in addressed problems, insights and proposed ideas varies from low to high. One of the communities deals with 31 problems, while others focus entirely on a single problem. However, some communities, although positioning their activities in a certain field, apply different approaches to address the challenges present in the field. In such cases, researchers assessed the diversity of the addressed problems as medium. Analysis of this part attempted to ground estimations on site mapping, including "data mining" (Liu, 2007) and "web scraping" (Glez-Pena et al., 2013) techniques in the future research.

The attempts resulted in creation of nine maps of URL references to websites of Internet communities subsequently exported to a Microsoft Excel data sheet. The site mapping helped to better understand the website structure and identify latent areas that are hardly visible during usual browsing (e.g., when URL references include clear categories, topics or tags, diversity in tackled problems, insights and proposed ideas is quite easy to identify and where the URL references include information about authors of articles or ideas, even general activeness of participants may be identified). Therefore, the method may be ideal for analysis of smaller communities websites which are stored in a separate domain (e.g., *www.tiriamabendruomene.lt*) and supported by popular content administration systems (*WordPress*, *Joomla*, etc.) as they have clearly standardized Internet reference (URL) output mechanism and their basic configuration automatically supports categories, tag and authors. In the present case, diversity, size and complexity of websites were too excessive for such analysis.

The indicator of the diversity in inclusion forms involves such criteria as the level of opportunities to disseminate knowledge (the content generated by the community), the level of game based approach and the level of adaptability to various age groups. According to the first criterion, observation results reveal that only several communities apply more than three knowledge dissemination mechanisms (e.g., *Facebook*, *Twitter*, *Google+*, *LinkedIn*, *e-mail*) to ensure communication flexibility and maximum involvement of the society into their activities. However, projects that use only one way of knowledge dissemination (e.g., group e-mail conferences) are also present, whereas the majority of the observed communities use two ways of data dissemination. Almost all community projects lack advanced competition elements (i.e., have

low level game based approach). Such circumstance has an adverse effect upon community's attractiveness to new members and motivation of the old ones since the element of competition is an important condition for active people to realize their creative abilities. None of the analyzed communities has properly adapted their activities to different age groups; thus, according to the level of adaptability to various age groups, the communities are rated as low.

Table 34. Monitoring instrument and evaluation results of creativity capacity

Component	Indicator	Evaluation guidelines	Quantitative assessment results (Number of communities)
Diversity of the sources of ideas	Number of female participants in the project (%); national and age diversity (%); where the percentage data are absent, diversity of gender, age and nationality is assessed as follows: considerable, medium, small.	The researcher subjectively estimates diversity of visitor's gender, nationality and age on the basis of the acquired data. The diversity is low when the acquired data show that the majority of the visitors involves only individuals of a limited age group, including exceptionally only one gender and one language, and comprises a limited geographical area (e.g., one city). Where assessment of diversity is very complex, the diversity is assessed as "medium" as the purpose of the assessment is to identify exceptional projects where diversity is high (clearly observed balance, presence of data, use of several languages, inclusion of several geographical regions) or practically absent and the group represents narrow interests and is homogeneous.	High = 0 Medium = 10 Low = 1
	Level of addressed problems, proposed ideas, insight, etc.; high, medium, low.	The assessment is "high" where more than 8 social spheres are addressed, the assessment is "medium" where 4-7 social spheres are addressed and "low" where less than 4 spheres are involved.	High = 2 Medium = 5 Low = 4

Level of diversity in inclusion forms	The level of opportunities to disseminate knowledge (the content generated by the community); evaluated in accordance with the number of knowledge dissemination channels; high (more than 2 channels), medium (1-2 channels), low (none).	The researcher evaluates whether knowledge dissemination mechanisms exist. Assessment from the user point of view: simplicity of knowledge dissemination and the number of introduced mechanisms. Possible options to share data: Facebook, Twitter, Google+, LinkedIn, e-mail, etc.	High = 3 Medium = 6 Low = 2
	The level of game based approach; high, medium, low.	Assessment of whether elements encouraging competition are present. Competition elements are popular among gaming communities, including lists of leaders and incentive points (e.g., "kudos" or "karma points"). If elements of competition are absent, the assessment is "low".	High = 0 Medium = 4 Low = 7
	The level of adaptability to various age groups: high, medium, low.	Assessment of whether a clear identification of different age groups and clear communication mechanism designed for specific age groups are present.	High = 0 Medium = 1 Low = 10

Review of the evaluation of the capacity for knowledge aggregation. Capacity of knowledge aggregation is estimated on the basis of two components: degree of interdependence and attraction of the critical mass (development of the "swarm effect") (see Table 34). The degree of interdependence is expressed in the network density and network amplitude. However, the measurement requires access to community's primary statistical data that was not granted to the researchers. Although opportunities to evaluate the degree of interdependence were absent, the second integrated indicator (attraction of the "critical mass") is measured

by means of seven criteria that are used to collect quantitative data (where access to community's primary statistical data is available) or carry out qualitative estimations (where statistical data are not available).

According to the criterion of general activeness of participation in voting and commenting, the vast majority of communities are of medium level and none of the communities may estimate activeness of their members as high. Low level of activeness is observed in the communities that lack elements of interactiveness with the exception of the questionnaire to be filled in during subscription. Presumably, such communities offer another environment to their registered users; however, the necessary information was not available to the researchers. Only one community could be given numeric values to estimate the number of general visits to the website, the total number of unique visitors, the number of repetitive visitors and the number of unique visitors that became registered users. According to these criteria, the community level was estimated as high since the numeric values indicate considerable activity of the participants, e.g., over 88,000 visits, over 60,000 unique visitors and over 30,000 repetitive visitors. Meanwhile, the indicator of the "swarm effect" achievement of other communities was estimated as medium since data on visitors of the principal websites are absent, but the descriptive criteria may be judged visually on the basis of the number of placed announcements or analysis of member activeness targeted at social networks (LinkedIn, Facebook, etc.). The data necessary to evaluate the communities on the basis of the last indicator, the attraction of the "critical mass" (the number of contributors/ data units posted by contributors), were collected form social networks on the basis of the number of Facebook "likes", LinkedIn members or Twitter followers. According to these data, the majority of the communities was estimated as medium (2000-7000 "likes" and other records on the contributors); however, communities whose contributors of contributor posted information units number only 250-550 are also present. Such communities were assessed as having a small number of contributors.

Attempts to increase reliability of the data were made by finding access to objective statistics on attendance or similar data. Analysis of website source codes attempting to find a tag on the use of any analytical system collecting data on attendance helped identify 7 websites that use Google Analytics or Google Analytics Universal scripts and 1 website that uses its own system of unknown origin. To obtain more reliable data, all

observed subjects were requested to give access to Google Analytics or an alternative data monitoring system.

Only one of the observed subjects agreed to grant such access. As Google Analytics is an independent system administered by a third party, the data of which may not be altered by website administrators, the researchers took advantage of the use of the granted access. Such access allowed a better monitoring quality of the components of creativity capacity and knowledge aggregation.

One of the observed subjects informed that they used an alternative independently developed system instead of Google Analytics because of personal distrust in the company. However, they refused to give an independent access to their system and offered submission of data on an individual request. As the use of such system or data submission on request would have contradicted the non-interference policy of the experiment and allowed website administrator's manipulation of data while responding to the requests, the offer has been rejected.

Table 35. Monitoring instrument and assessment results of knowledge aggregation and capacity component

Compo-nent	Indicator	Assessment guidelines	Quantitative assessment results (Number of communities)
Degree of interde-pendence	Network density (numeric value of the social network analysis); network amplitude (numeric value of the social network analysis)	Qualitative evaluation impossible. Evaluated where access to community's primary data is available.	No data
Attraction of the "critical mass" ("swarm effect")	General activeness of participation in voting and commenting (number of votes/comments); where precise data is absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	Estimations are done visually on the basis of an average number of comments: "high" where an individual idea is given over 50 votes/ comments; "medium"– from 10 to 50 votes/ comments and "low" where votes/comments are absent or only occasional.	High = 0 Medium = 3 Low = 8

	Total number of visits to the website; where precise data are absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	Estimation is done on the basis of participant activeness (amount of placed information).	High = 1 Medium = 8 Low = 2
	Total number of unique visitors; where precise data are absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	The total number of unique visitors reflects the general interest in the project. It should be noted that where primary data are available, the "total number of visitors" and the "total number of unique visitors" are indicated. The researcher has to choose the "total number of unique visitors" as the number identifies actual people and not just the visits. Where numeric data are unavailable, estimations are done visually on the basis of diversity of the names of commentators.	High = 1 Medium = 8 Low = 2
	The number of repetitive visitors; where precise data are absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	Where numeric data are unavailable, estimations are done visually on the basis of repetition of the names of commentators.	High = 1 Medium = 8 Low = 2
	Ratio between the number of unique visitors and the number contributors; where precise data are absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	In a dynamic and active system, accidental unique visitors usually become active users referred to as contributers. Where the researcher has access to primary data on the visitors, the estimation is "medium".	High = 1 Medium = 9 Low = 1

	The degree of transformation of unique visitors into registered users (percentage of unique visitors who become registered users); where precise data are absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	Where the researcher has access to primary data on the visitors, the estimation is "medium".	High = 0 Medium = 9 Low = 2
	The number of contributors/ contributor placed information units; where precise data are absent, estimations are done in ranges, according to initiator posted information or visually: high, medium, low.	Contributors are commentators, critics, proposers of ideas or those who simply pressed "like". Unlike common visitors, they indicate proportion of engaged users and differ not in their demographic characteristics, but also in their activeness/intensity of idea development (engagement). If the community has a social network interface (e.g., Facebook), it may be assessed on the basis of the number of "likes": "high" (over 7000 "likes"), "medium" (from 2000 to 7000 "likes"), "low" (less than 2000 "likes").	High = 1 Medium = 5 Low = 5

Review of the evaluation of decision-making and problem solution capacity. The dimension of decision-making and problem solution has two integrated components: efficiency of problem solution and decentralization and interaction degree (see Table 35). The component of problem solution efficiency is characterized by the level of technological sport to the development of ideas (decisions) and the level of completeness of alternative analysis. On the basis of the first criterion, half of the communities were assessed as low since they lack relevant instruments for the development and dissemination of ideas although some communities allow their registered users to comment on placed records, while others

provide active communication only via Facebook, but the communication is still absent. Some communities that have a medium level of technological support to the development of ideas offer opportunities to place personal information and react to (comment on) the placed records. Others offer key instruments and encourage participants to share ideas but lack a clear system and, therefore, resources are frequently wasted in vain and motivation to take a more active participation in discussions is lost. Communities that have a high level of technological support offer advanced mechanisms that allow participation in referendums and possess bank system user interfaces. The level of completeness of alternative analysis is low in almost all communities as instruments for an alternative analysis are absent unless registered users choose to conduct such analysis in other environments. Medium level communities offer technical opportunities for alternative analysis; however, such opportunities are rarely used.

The indicator of decentralization and interaction degree comprises six criteria: diversity of the ways to express opinions; procedures ensuring impartiality and equal opportunities to express and defend one's ideas; level of criticality; depth of problem analysis; level of privacy protection; anonymity level. Diversity of the ways to express opinions is low in the majority of the observed communities as they lack instruments to express opinions or such possibility is granted only to registered users. Communities that have a high diversity of the ways to express opinions create conditions to vote, publish ideas in the website, write e-mails, make calls, react in Facebook, etc. In terms of procedures ensuring impartiality and equal opportunities to express and defend one's ideas, high level communities provide clear procedures on the content of published information and prevention of defamation, clearly describe procedures to be followed when the content is unacceptable and offer an opportunity to react to comments. Medium level communities have provisions on equal rights and expose attempts to ensure correctness of information and respect to personal opinions although fail to clearly state their aspirations. As for the level of criticality, low level communities prevail since discussions based on critical opinions are usually substituted by formal comments and closed discussions. A high criticality level community typically provides procedures to express opposite opinions, hold discussions and deal with disagreements. Assessment of the depth of problem analysis reveals that problems in low level communities are raised by organizers, whereas public involvement remains passive. Also, problems

addressed in such communities are described very concentrically and focus on community's objectives rather than on the problem itself. Opportunities for public discussions are scarce, as well. Subjects of medium depth of problem analysis offer discussion opportunities but fail to unfold intensive discussions or comments on individual messages. As to the level of privacy protection, evaluations of the communities vary from low to high. High level communities provide actual procedures, inform on introduced safety measures and create preconditions to ensure anonymity and privacy. Low privacy level communities even refuse to publish such information or give it to registered users in another environment. Medium level communities introduce minimal requirements for privacy and data protection that have to be accepted by subscribers. As to the level of anonymity, the medium level is attributed to the communities where possible anonymity is offered, but the actual use of community services and exchange of data requires disclosure of personal information. Low anonymity level communities identify active participants and encourage open expression of opinions. High anonymity level communities create conditions (and give advice) for their participants to maintain anonymity and allow the participant to decide on whether to use the anonymity guarantees.

Table 36. Monitoring instrument for decision-making and problem-solving potential and evaluation of results

Component	Indicator	Evaluation guidelines	Quantitative evaluation results (Number of communities)
Effectiveness of problem-solving	Level of technological support (solutions) for the development of ideas: high, average, low.	The evaluator must assess how existing technological solutions help or hinder the development of ideas. For example, Article/ Problem/Idea or Online Forum Articles – if there is no clear system and there are only many scattered and unstructured exchanges of opinion, then the level is evaluated as "low". If an online forum has separate threads for the presentation of ideas and their development, the level can be evaluated as "average". If a project presents a clear orientation towards the collection of aggregated information, the level can be evaluated as "high".	High = 1 Average = 4 Low = 6

	Comprehen-siveness of analysis of alternatives: high, average, low.	The main objective of the evaluation is to determine whether the path from idea to solution is one-directional/linear or consists of more dimensions and alternatives. The analysis of alternatives must not necessarily be explicit. The level of comprehensiveness is evaluated as "high" if procedures are described and one can discern the path, including an analysis of alternatives, that led to the final decision; as "average" if procedures are not described, but at least a superficial analysis of alternatives was attempted; and "low" if alternatives were never even analysed.	High = 0 Average = 1 Low = 10
Degree of decen-tralizа-tion and interac-tion	Variety of methods for the expression of opinions. Evaluated visually in intervals: high, average, low.	The evaluator must pay attention to the dominant forms and alternatives for expressing views. For example, if there is only one way an opinion can be expressed, then the level of variety is "low". If ideas and suggestions can be submitted in various ways (online, e-mail, phone, Skype, face-to-face meeting), the level of variety is "high".	High = 2 Average = 0 Low = 9
	Procedures that ensure equal opportunity for individuals to express and defend their views, help avoid subjectivity and bias; level of equal opportunity provided: high, average, low.	The evaluator must assess the possibility to express views in the last stages of the decision-making process. It is often the case that systems are very open at the initial stage of idea gathering, however, the final decision is made only by a very small group of people, and the people behind the initial ideas no longer have the possibility to express their views about whether their ideas or suggestions were implemented properly. The evaluator must subjectively evaluate whether the described procedures/ instructions will provide for the possibility to avoid subjectivity and bias. Signs of a fairly managed system are as follows: discussions are moderated in a way that allows everyone to have their say; it is possible to identify the order and stages of development in suggestions and ideas.	High = 2 Average = 6 Low = 3

Degree of independence	Level of criticism: high, average, low.	Evaluated based on the content of discussions and whether analyses of information/ideas/problems are met with any criticism.	High = 1 Average = 2 Low = 8
	Depth of problem analysis: high, average, low.	Level of comprehensiveness in problem analysis. Are possibilities provided for discussion (and do discussions occur), is reasoning presented, are alternatives suggested and can one vote for them.	High = 0 Average = 3 Low = 8
	Level of personal privacy protection: high, average, low.	Level of privacy policy and security measures implemented.	High = 2 Average = 3 Low = 6
	Level of anonymity: high, average, low.	Evaluations are made based on extremes: complete anonymity ('high') and voting via online bank account or with e-signature ('low').	High = 1 Average = 5 Low = 5

CI Emergence Index. The CI emergence index is composed of 3 main dimensions: self-organisation potential, intensity of CI emergence and adaptivity potential.

Overview of self-organisation potential evaluation results. The dimension of self-organisation potential is assessed according to two integrated components: the degree of a community's culture and transparent structure and the consistency of community aims and self-organisation practices (see Table 36). The first integrated indicator is defined by four criteria, one of which is the level of descriptiveness for norms, procedures and activities. According to this indicator, most of the researched communities were evaluated as being of average or low level. Low level is attributed to those communities which do not present any guidelines for their activity organisation or, in presenting their main information, fail to present their activity profile. Average level is attributed to communities whose general principles are included in their rules to be accepted by individuals if they want to be involved in the community activity (member registration), also present their structure and functions.

In communities with a high level description of norms and procedures, information about their procedures, responsibilities, limitations, additional suggestions for problem-solving and a variety of solutions are extensively presented. According to the other criterion – level of self-presentation – the majority of the observed communities present their aims, history and projects in a brief form, and their "about" section implies community functions. According to the above mentioned criterion, communities using such methods of self-presentation are evaluated as average. Some of the observed objects demonstrate a high level of self-presentation as they provide comprehensive information, ranging from values, frequently asked questions and community history to short films. The third part of the community culture and transparent structure indicator is the level of generally accepted vocabulary/terminology/concepts development. The majority of communities are evaluated as being low-level according to this criterion as no hints are given regarding the main concepts used by the participants. However, there is one community that explains the concepts/situational definitions and gives guidance to behavioural patterns in encountered certain situations. According to the level of referrers" attraction criterion, the observed communities could not be evaluated because researchers did not have access to these data.

The indicator for consistency between community aims and practices of self-organisation is defined by several criteria: the level of consistency of leadership models with aims; the level of consistency of aims with the nature of community activity; the level of balance between community and individual aims; technological as well as procedural accessibility. The level of consistency between leadership models and community aims distributes itself almost evenly as high and average. A high level of leadership model consistency with community, individuals/their groups" responsibility for dealing with various problems because of different messages, evidence the leadership model conformance to the concept of community activity. It is possible to envisage in the average-level subjects that those who want to join activities could be oriented towards certain activities according to their interests and possibilities to contribute to special projects. The level of aims consistency with the nature of community activity was evaluated as high by most of communities. These online communities have evaluated the consistency of the aims being raised with the set-up of their activity and have accordingly set

appropriate procedures and applied technological possibilities for their realisation. According to this criterion, the communities identified as average-level communities were those which did not set themselves the aim to raise certain issues/discuss problems/make decisions. However, it is possible to envisage that such mechanisms could likely help to attract more people who could help to implement the community's aims. The evaluation results of the level criterion of the balance between community and individual aims range from average to high levels. The communities with average levels of balance are defined not only those which have the content that corresponds mostly to the aims of the community itself, but also cater to and offer solutions that correspond to the aims of narrower interest groups or political interests. The balance between community and individual aims level was identified as high in those communities which demonstrated a consistency between messages and the community's mission, implemented procedures and technological measures allowing initiators to retract messages of inappropriate content, whereas members were provided with the right to inform initiators about messages with the content not corresponding to principles of the community's activity. The last element of the consistency indicator between community aims and self-organisation practices is technological and procedural accessibility. A high level of procedural and technological accessibility means that anyone desirous of joining the community can do so without complex registration procedures and that certain measures are applied to maintain anonymity if a member wishes to do so. Accordingly, the average level of procedural and technological accessibility means that there are certain restrictions to access, e.g., registering requires submitting an e-mail address or connecting via Facebook, Twitter or other social networks, thus, potential members must be registered to certain platforms beforehand. Average accessibility is conditioned by community practices when there is a possibility to observe all uploaded content freely, with registration necessary only if an individual wishes to participate more actively. The communities with a low level of technological and procedural accessibility have installed complex sign-up mechanisms and set certain restrictions (e.g., a minimum requirement for work and international experience). It is probable that such requirements obstruct the contribution of good ideas that might be otherwise submitted by active candidates with less experience.

Table 37. Instrument and evaluation results for the component of self-organisation potential

Component	Indicator	Evaluation guidelines	Quantitative evaluation results (Number of communities)
Degree of development of community culture and transparent structure	Level of presentation of general norms, procedures and activity: high, average, low.	Evaluated as "high" if all procedures are described and members must read the description and confirm their agreement when registering. Evaluated as "average" when general principles are described, but individual procedures are not specified. Evaluated as "low" if there are no references as to how activity is organised in the community.	High = 1 Average = 5 Low = 5
	Level of self-presentation: high, average, low.	Evaluation based on the variety and quality of the presentation of community mission and vision statements, code of ethics, declarations, procedures and self-organisation, i.e., the actual value of the project description is assessed: is it simply a formal description of the project, does it attempt to demonstrate its mission/vision and does it seek to present its activity in various ways?	High = 3 Average = 8 Low = 0
	Level of development of generally accepted vocabulary/terminology/concepts: high, average, low.	Evaluated as "high" if concepts and terminology are described, in this regard certain joint decisions and discussions were carried out; evaluated as "average" if no terminology is presented, but discussions related to the subject can be observed; evaluated as "low" if there is no analysis of terminology or discussion about any attempts to define terms.	High = 1 Average = 1 Low = 9

	Level of attraction of referrers: high, average, low.	Evaluated according to Google Analytics (if the researcher had access to this information). Google Analytics data demonstrate the actual exchange of visitor flows.	No data
Consistency of community aims and self-organisation practices	Level of consistency between leadership model and aims: high, average, low.	Evaluated how on the nature of activities a leadership model corresponding to the goals to be targeted is chosen: "high" if a community has discussed and determined the most suitable mechanisms and methods for achieving its aims; "average" if no agreements regarding the assignation of roles in the implementation of aims is presented, but a certain level of organisation can be observed with regard to the nature of activity; "low" if operations are carried out incoherently and without looking for more effective forms of management.	High = 6 Average = 5 Low = 0
	Level of consistency between aims and the nature of community's activity: high, average, low.	Evaluated whether mechanisms have been put into place for implementing the activities indicated in a community's mission. For example, if a community mission indicates that discussions should be held and action should be taken regarding certain social issues, then operations must be organised and mechanisms must be implemented in such a way that would enable those involved in the community to submit ideas, vote for them, present their views, offer alternatives that would also be discussed, choose the most suitable options, etc. Evaluated as "high" if instruments have been set up to enable the implementation of community goals; "average" if the technological solutions only allow the implementation of some of the goals; and "low" if not enough technological solutions have been put into place in order to implement activities indicated in community mission/vision statements.	High = 8 Average = 3 Low = 0
	Level of balance between community aims and individual aims: high, average, low.	Evaluated whether the issues raised and the ideas and comments presented correspond to the aims of the community, i.e., whether the presented content is at the level of social relevance that is indicated in the project mission. Evaluated as "high" if the published content corresponds to community aims, and if the information that does not correspond to these aims is ignored by other members; "average" if the greater part of the content corresponds to community aims; and "low" if material is published without showing consideration for the common aims of the community and most efforts are targeted at satisfying individual interests.	High = 3 Average = 8 Low = 0

	Technological and procedural accessibility: high, average, low.	Researchers evaluate technological accessibility based on accessible data and by using at least several types of technological tools (various browsers, computer/tablet device/mobile phone/phone/e-mail/SMS message/Skype, etc.). If it is apparent that a system is adapted for various devices, technological accessibility is evaluated as "high'; if a system allows the use of at least several different instruments, it is evaluated as "average" (even if some of the platforms are not always convenient); if a system only allows suggestions to be submitted in a form that requires installing additional software or the system is targeted at just one system (e.g., a program can only be used with Windows OS or registration is only possible with a Gmail account or a tablet app only works on Apple iPads), then technological accessibility is evaluated as "low". Procedural accessibility is evaluated on the basis of the following aspects: a system is procedurally accessible ('high" accessibility) when it can potentially allow a large number of people to join, when it has a simple registration procedure and when at least some functions are accessible free of charge and without the need to register (e.g., voting, commenting). Accessibility is considered to be "low" if the system is oriented towards members-insiders that need to complete a difficult registration process with artificial obstacles (belonging to a certain organisation, a large membership fee, the requirement to submit personal information, etc.) in order to become members.	High = 4 Average = 5 Low = 2

Overview of evaluation results on the intensity dimension of CI emergence. The intensity of CI emergence component is assessed according to two integrated indicators: degree of qualitatively new output (including ideas, activity, structured opinions, competencies development and other forms) and the development of a distributed community memory system (see Table 37).

The degree of qualitatively new output is assessed by the number of ideas submitted for discussion/voting, the level of aggregation of information (an idea is improved after comments are submitted) and the variety of generated information/intellectual products. According to the first criterion, the communities studied were evaluated as "average" and "low". The communities that were evaluated as having "average" levels were those that, first, did not allow for the possibility to accurately determine the flows of presented ideas (without access to the primary statistical data), even though it was visually apparent that a great variety exists with regard to different categories (at least 6 categories). Second, these communities have created the conditions to submit original ideas that could not otherwise be attributed to existing categories. Third, these communities ensure a constant flow of new ideas. The communities with low levels of idea submission do not present ideas and simply resort to presentation of information about what projects are being implemented in view of the organisation's goals and allow individuals to submit messages about problems or to comment on them (without voting). The communities studied also demonstrated average and low levels of knowledge aggregation. In some communities, the level of knowledge aggregation is average, even though a certain idea does not change after comments, the idea can be developed in the comments and the realization of a full level of aggregation would not be difficult. Low levels of aggregation are determined when participants do submit data and ideas; however, there is no evidence that information is further analysed or it is difficult to envisage that any work is being done to deal with ideas. According to the variety criterion of generated information/intellectual products, only a few communities were evaluated as being of a "high" level, the judgment is based on the analysis of topics and the completed content. However, the majority of the communities were evaluated as being of an "average" level because the assessment of ideas was not possible without registration. This level also includes the communities which members present quite

a substantial variety of suggestions, and although new knowledge is not generated together, the communities do not aim at it.

The development of distributed community memory systems is evaluated by using the following criteria: the level of ability for the development of ideas and the level of use of evidence-based information (scientific/technological/statistical information). According to the first criterion, "high" level communities present clear procedures and create possibilities for developing solutions from ideas, and such activity results are clearly seen. Communities with "average" level abilities do not aim to develop ideas together, thus, problems are not solved together, or this process probably occurs through another platform available only to registered users. Communities with "low" level of ability for developing ideas do not allow the submission of ideas (although the nature of their activity might actually necessitate such procedures), but they do publish information submitted by participants, it is probable that initiators process the data they receive although the procedures and results of any such processes are not visible on their websites. The level of use of evidence-based information (scientific/technological/statistical information) was most frequently evaluated as low. Only rarely in the pages of communities and in the descriptions of their projects and campaigns brief statistics are presented that would explain the scale of the problem. It is likely that registered users exchange such information, but it would be meaningful to present evidence of certain problems to the general public, as well. Communities evaluated as "average" present ideas that are considered daily and practical; however, some of these ideas presentations are based on the comprehensive and impartial analysis of information.

Table 38. Monitoring instrument for intensity of CI emergence and evaluation results

Component	Indicator	Evaluation guidelines	Quantitative evaluation results (Number of communities)
Degree of new quality output (ideas, activity, structured opinions, competency development and other forms)	Number of ideas submitted for discussion/voting: high, average, low.	Evaluated according to available data (if accessible), the number of ideas/alternatives submitted for solutions or the number of ideas that led to the aggregated and fully-developed solution. It is most important to determine whether selection is made out of "one candidate" or whether there was a thorough discussion or analysis.	High = 0 Average = 7 Low = 4
	Level of knowledge aggregation (ideas improved after comments): high, average, low.	Evaluation is made if after voting/discussion/comments the overview and assessment of submitted opinions are conducted. Evaluated as "high" if after the discussion/voting period is over, information is analysed, assessed, summarised and presented to the community, and the community can then be informed of/vote on or implement the solution; "average" if data about the most important issues are analyzed and evaluated and the results are presented in a summarised form; and "low" if the information undergoes no further analysis once the data are collected from participants.	High = 0 Average = 6 Low = 5
	Variety of knowledge/ intellectual output: high, average, low.	Evaluated on the basis of results: events, positions, overviews, etc.	High = 1 Average = 10 Low = 0

Development of a distributed community memory system	Level of ability for the development of ideas: high, average, low.	Evaluated on the basis of the descriptions of procedures for the development of ideas, focusing on the identification of a mechanism for knowledge aggregation, i.e., whether new information is generated, whether output of a new quality is developed from submitted material and old ideas. Evaluated as "high" if there are clearly described procedures that are implemented by creating new knowledge and by developing it to specific proposals for making solutions; as "average" if procedures are not presented, but there is evidence of information being gathered, processed and developed and proposals for problems solutions are generated; and "low" if there is no evidence of systematic knowledge generation to solve problems and when no specific proposals are made.	High = 1 Average = 7 Low = 3
	Level of use of evidence-based information (scientific/ technological/ statistical information): high, average, low.	Evaluated as "high" when provisions in procedural descriptions are aimed to support the goals by reliable/objective information and when in discussions and alternatives analyses the presented arguments are based on scientific/technological information; as "average" when even it is not required that in discussions/alternatives the arguments based on scientifically/technologically grounded information were presented anyway; and "low" when only occasionally the argumentation of information is on the basis of scientific/ technological evidence.	High = 0 Average = 3 Low = 8

Overview of evaluation results on adaptivity potential dimension. The component of adaptivity potential is defined by the integrated indicator for abilities to adopt change (the development of learning and advancement processes in the community), which is further elaborated by two criteria: the level of consistency between the aims indicated in the mission/vision statements and community activity, and the level of learning encouragement in the project (see Table 38).

Based on the consistency of the aims presented in the vision/mission statements and project activity, the majority of communities studied were evaluated as being of a "high" level. Such communities raise different issues and seek to solve various problems at the national level or they focus on one area but analyze the problems of this area in a broader sense and from various perspectives and by integrating the analysis of roots of reasons. Communities evaluated as "average" or "low" according to this criterion operate virtually on an individual basis and do not have a very clear community vision/mission.

The level of learning encouragement within the project ranges from low to high where at the low level those communities appear that even do not mention the importance of learning and advancement when acting together. Average level communities do not articulate that they seek to contribute to learning, but the presentation of legal information and an advice section can be viewed as an educational activity. According to this criterion, in high level communities the encouragement of learning does not necessarily have to be articulated clearly; however, the organisation and its activity are geared towards the improvement of learning processes, organise educational events for individuals interested in science from various age groups and announce competitions for the best work. The communities are also attributed to the high level group if their activity is oriented towards the promotion of improvement, learning from the best and presentation of advice.

Table 39. Adaptability potential monitoring instrument and evaluation of results

Component	Indicator	Evaluation guidelines	Quantitative evaluation results (Number of communities)
Ability to adopt change, ability to learn and improve	Level of consistency between aims indicated in the vision/mission statements and activity: high, average, low.	Evaluated as "high" if an initiative has been set out to solve issues at the global/national level, and a community is raising and discussing issues of the appropriate level; as "average" when the majority of operations relate to the level of issues anticipated in the mission/vision and no more than 40% of the problems raised by a community are of a lower level of relevance; and "low" if the level of the majority of issues dealt with by a community does not correspond frequently to the aims set out in the mission/vision.	High = 8 Average = 2 Low = 1
	Level of promotion of learning: high, average, low.	Evaluated as "high" if a community declares itself as promoting learning and actually promotes learning in reality; as "average" if only declares itself as promoting learning; and "low" if the process of learning is not even referred to in the descriptions of community activity.	High = 5 Average = 2 Low = 4

The Dimension of Social Technology Index. The dimension of social technology is defined by six integrated indicators: external and internal networking/collaboration technology, ensuring security and privacy, decision-making support, technology for generating and sharing knowledge, media/design quality, data aggregation and evaluation technology (see Table 39).

When analysing the objects of this study according to the level of their external and internal networking/collaboration technology, one can observe that they have the best developed technology for participating in the activity of online communities by way of various devices (computers, smartphones, tablet devices, etc.). However, most of the online community websites do not have sufficiently developed technological possibilities for

discussion and more often members are redirected to register through social networks and to use the possibilities these networks offer. The technological solutions for ensuring anonymity depend on a community's decision to guarantee or not guarantee anonymity.

Based on the level of technology for ensuring security and privacy, the results were distributed almost evenly – almost half of them had installed such technology. Decision-making support mechanisms are directly related to the aims of communities to ensure or not to ensure the decision-making process in their activity. About half of the online communities studied had installed technological solutions for collective brainstorming and conclusion or decision-making. However, only a few communities make use of voting and/or ranking mechanisms.

The level of knowledge aggregation and sharing technology could be viewed as higher than average. The best developed technology was that which contributed to the visualisation and organisation of information, the formation of interest groups and the provision of possibilities for contributing to the value of information. However, it is important to note that the technological level was assessed only within the context of the communities studied. If we were to compare this level to that of foreign online communities, only a few Lithuanian communities could receive positive evaluations. From a media and design quality perspective, the communities studied were generally evaluated as average, and just a few could be recognised as having created a user-friendly and convenient environment. It is also worth noting that, from a design perspective, the communities observed demonstrate high levels of consistency with their stated aims. Many of the communities presented their work rather conservatively, thus, their design solutions were accordingly spare.

In terms of data accessibility and aggregation, the communities studied have been best evaluated according to the existence of a data collection mechanism. The great part of the communities has appliedmore than one technological solution for collecting data. However, evaluations are less positive from the perspective of technology for analysing and evaluating activity as well as sharing and organising information. It is worth noting that positive evaluations were received by those communities that do not use the said technologies explicitly (accessible from their main website), but it is possible to anticipate that they are accessible at other "deeper" layers, which are only accessible to registered users.

Table 40. Monitoring instrument for social technology component and evaluation results

Indicator	Evaluation criteria	Evaluation scale	Quantitative assessment results (Communities number)
External and internal networking/ collaboration technologies	Existence of mechanism for anonymous offering of ideas	Yes/No	Yes = 6 No = 5
	Existence of synchronous and asynchronous chat tools, open forums, etc.	Yes/No	Yes = 3 No = 8
	Provided access and integrated service to all devices (handhold, PCs, etc.)	Yes/No	Yes = 9 No = 2
Privacy and security assurance technologies	Existence of mechanism for providing secure and legal activities, protection of personal data	Yes/No	Yes = 5 No = 6
	Existence of mechanism of message control	Yes/No	Yes = 4 No = 7
Decision-making technologies	Existence of mechanism for collective brainstorming	Yes/No	Yes = 6 No = 5
	Existence of mechanism to vote/rank an idea/solution	Yes/No	Yes = 3 No = 8
	Existence of mechanism to make decisions or conclusions	Yes/No	Yes = 5 No = 6
Sharing/ creating knowledge technologies	Existence of mechanism to add value to content	Yes/No	Yes = 7 No = 4
	Existence of mechanism to generate feedback	Yes/No	Yes = 4 No = 7
	Existence of technological solutions for knowledge visualisation and organisation	Yes/No	Yes = 9 No = 2
	Existence of mechanism for idea classification	Yes/No	Yes = 6 No = 5
	Existence of mechanism for mass argumentation	Yes/No	Yes = 3 No = 8
	Existence of mechanism to create interests groups	Yes/No	Yes = 6 No = 5
Media/design quality	Degree of user friendliness, speed and convenience	High/ Medium/ Low	High = 3 Medium = 8 Low = 0
	Quality of visualisation	High/ Medium/ Low	High = 3 Medium = 7 Low = 1

	Level of development possibilities	High/ Medium/ Low	High = 0 Medium = 6 Low = 5
	Design relation to task	High/ Medium/ Low	High = 7 Medium = 4 Low = 0
	The perpetual beta (updating possibilities)	High/ Medium/ Low	High = 1 Medium = 4 Low = 6
Data aggregation and data access technologies	Existence of mechanism to collect data	Yes/No	Yes = 9 No = 2
	Existence of mechanism to evaluate and analyse performance	Yes/No	Yes = 6 No = 5
	Existence of mechanism to share and re-use the data	Yes/No	Yes = 5 No = 6

Summing-up and conclusions. The first stage of observation revealed the complexity of monitoring online community activities. Obviously, not all aspects of performance can be measured by quantitative criteria, but some numeric data are extremely important. Measuring such data over a period could help diagnose and prevent reduction of community members" motivation or diminished activities. Testing demonstrated that some of criteria could be attributed to more than one element of the framework. However, the unique criteria could have a different level of influence on different elements. In addition, different criteria for monitoring the unique element could be of different importance. Therefore, it would be expedient to rank each criterion by its relevance. However, researchers could not access reliable data at this stage of experiment. Therefore, the importance and correlations of diverse criteria were not analyzed yet and are planned for upcoming research stages. Moreover, the framework could be more sophisticated by demonstrating cause-effect links between criteria where applicable. However, for identification and validation of such relationships, other research techniques are required ensuring collection and analysis of actual data and testing of hypotheses (deeper analysis of relationships in chapter 5.4 by introducing a system dynamic model).

The second stage of observation and evaluation mostly confirmed and elaborated upon the conclusions made in the initial stage of observation and evaluation. The evaluation of the creativity component confirmed the conclusions of the initial study and demonstrated that it is, indeed,

difficult to gather data, especially about sex, age and nationality of users. However, researchers noticed that if it was possible to gain independent access to the Google Analytics data of the online community's website and the initiators had enabled the presentation of demographic data and interest reports, then it was possible to acquire relatively objective data collected according to the Google method (Support.google.com, 2014) not only about the age and sex of the users (what has been analyzed in this project), but about their general interests, as well. In consideration of the difficulty of collecting data in most cases, i.e., when researchers do not have access to such data, less importance should be placed on this criterion in the future research.

The variety of issues addressed by online communities was great. It is very difficult to evaluate and compare communities based on the variety. A comparison would be more meaningful in a more homogeneous selection of online communities. Analysing such communities would provide for the possibility of applying data mining and web scraping techniques, which would improve the quality and reliability of such an analysis, especially with regard to small communities that use a separate domain for their activity. This criterion, along with the evaluation of the quality of problems, is one of the most important, and thus, more importance should be placed on it in the future research.

The observation was made that the majority of online communities use standard modules that allow the spread of information through Facebook, Twitter, Google+, LinkedIn and e-mail; however, very few communities use these platforms to the full extent. There are no elements of competition or elements of games in these communities either. However, in consideration of the missions and visions set out by the communities, not all of these tools are always necessary, thus, it would be meaningful to place less importance on these criteria in upcoming studies.

The evaluation of critical mass attraction (the "swarm effect") is a difficult undertaking, especially in the context of such a variety of communities (hypothesis H5. CI system has the potential for CI emergence, when the system has the capability to attract critical mass of contributors). However, this evaluation can be very important and great significance could be attributed to the formed criteria if the future research meets the following criteria: a) access to data from Google Analytics or a similar system is acquired for an object under observation; b) the

"swarm effect" is certainly necessary for an organisation or initiative in the implementation of its mission and vision (more is not always better); c) it is possible to identify specific supporters that create added value when solving a problem (e.g., by providing specific suggestions, synthesizing and analyzing information) and to distinguish them from the general mass of commentators, critics and "likers" on *Facebook*.

The analysis of effectiveness of problem-solving and degree of decentralisation and integration demonstrated the low level of maturity of almost all of the online communities when analyzing and solving problems by the collective method. With rare exceptions, exchanges of information are dominant. This correlates with the general level of passiveness in society, the level that is also demonstrated by other studies (e.g., the Lithuanian Civil Society Index). The observation was made that communities that seek to analyse problems and provide feedback as well as generalised and objective conclusions receive higher evaluations for other criteria, as well (technological training, analysis of alternatives, variety of ways to express views, procedures that ensure equal opportunity to have a say, privacy and anonymity issues). Thus, future research should pay more attention to the level of comprehensiveness of alternative analysis, and to measuring as well as analyzing the depth of problem analysis. Great significance must accordingly be attributed to the evaluation criteria of these areas.

The evaluation of self-organisation potential revealed that technological training was often superior to procedural training. That is, technical possibilities have been implemented, but there are no procedural explanations about how to use them or the final results they could lead to (hypotheses *H4. CI system has the potential for CI emergence, when it demonstrates competencies for transparent self-organisation and H10. CI system potential is related to the quality of technological solutions in the network*). The evaluation revealed a low level of descriptiveness of general norms, procedures and activities. There are also a few exceptions that do present comprehensive information, including the community values, history, terminology, a video and all the technological possibilities about how to express views and aggregate solution from them. Communities that have figured out their ideological and procedural levels are distinctly better prepared technologically speaking and are better at engaging their members. However, even in such cases, everything depends on the specific issue at hand and the additional efforts expended on the

dissemination of information about the problem or idea. A great disparity was identified between the different communities in the dimension of self-organisation. Thus, communities should be grouped into two categories in future research: mature communities and developing communities. When evaluating developing communities, more significance should be attributed to criteria, such as general norms, procedures and values, whereas an analysis of mature communities would benefit from a more appropriate assessment of balance, technological and procedural accessibility and, additionally, leadership (hypothesis *H4. CI system has the potential for CI emergence, when it demonstrates competencies for transparent self-organisation*).

As in the case of assessing self-organisation, evaluation of CI emergence intensity has revealed that there is a great disparity between developing and mature communities. However, even the best ones can reach an average level. During the course of the observation, a hypothesis was formulated that the main criterion, in this case, should be the degree of creation of qualitatively new output, such as ideas, activity, structured views, competency development and other forms. The conclusion can be drawn that the formation of Collective Intelligence in online communities is in its infancy, when it is too early to speak of specific results. However, an increase in civic engagement can also be viewed as collective consciousness and, at the same time, a form of collective intellect.

The evaluation of adaptability potential demonstrates promising tendencies in the online communities of Lithuania. Unlike with evaluation of self-organisation and CI emergence, communities are successfully dealing with problems and implementing their activity with a view to fulfilling their vision and mission. By carrying out their activity, most of the communities are in the active process of learning and exchanging information and this creates the preconditions for the development of Collective Intelligence in Lithuania.

The mathematical analysis and graphical visualisation of the empirical data illustrating the experiment conclusions is presented in the next chapter.

5.4. Mathematical Calculation of the Composite Potential Index of Collective Intelligence (CIPI)

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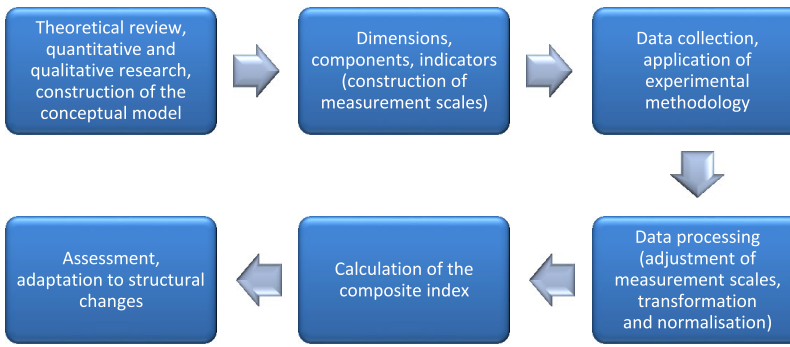
In the following part of the work, results of the scientific research presented in chapter 5.3. are given mathematical estimates with the aim to create Collective Intelligence Potential Index (CIPI) calculation methodology. According to the concept model of the composite index introduced in chapter 5.2., CIPI comprises three indexes: Capacity Index, Emergence Index and Social Technology Index. The index construction methodology is a constituent part of CI research methodology comprehensively described in chapter 5.2. and fully complies with the system approach to the analysed subject. On the basis of the composite index construction experience (see Chapter 5.1.1.), the following stages were distinguished in sub-index modelling (see Figure 52):



Source: compiled by the authors

Figure 52. Stages in Index modelling

1. Research problem, methods, formulation of hypotheses, quantitative and qualitative research (see Chapter 3.1). Upon identification of the problem and research scheme, hypotheses on CI potential were developed and quantitative and qualitative research to test the hypotheses were conducted.

2. A theoretical CIPI model has been constructed, CI dimensions, components, indicators and their measurement scales have been identified. Indicators were classified into categories according to their social content (see Chapter 5.1.2. Conceptual Model for CIPI Calculation).
3. Collection of data on the Internet communities. The experimental evaluation of Internet communities involved the use of a newly constructed measurement instrument. In the course of the experiment, the measurement scales were adjusted and improved.
4. The values of the indicators are of a qualitative nature; therefore, indicators underwent a qualitative evaluation and were ascribed numeric values that corresponded to their quantitative weight: 0; 0.5 or 1.

All calculated indexes depend on the logic-categorical variables that determine the results of the survey. The values of answers to questions were transformed into a numeric scale in accordance with the following procedure (keeping the property of monotonicity of function and according to the intuitive reasoning). The function *f*, describing this procedure, is defined by the following tables:

Yes	1
No	0

Other categorical variables were transformed into a numeric scale applying the same approach:

High	1
Medium	0,5
Low	0

To ascribe the numeric values, the variables underwent transformation ***f*** that retains the intuitive order of the values of the categorical variables in the set of non-negative real numbers. To preserve measurability features, a set of non-negative numbers has been chosen. Where the questions had no responses too often, their corresponding indicators were excluded from the index. If the interview failed to produce data only in several cases, the corresponding indicator was attributed to the most frequently recurring

value (such attribution is sufficient for the purposes of the experiment as more complex cases were absent); usually, when frequently recurring numbers include several values, the problem of missing data is addressed by ascribing the missing position of the arithmetic mean of the recurrent values.

5. Transformation f was also supplemented by rating indicator values (since the values (and scales) are chosen from the range [0,1]):
   - It is assumed that the weighted coefficients of each indicator inside each category is equal;
   - K_i is the estimate of weighted coefficient of i-th category, $K_i = \frac{1}{m_i}\sum_{j=1}^{m_i}\hat{I}_{ji}$;
   - is the transformed estimate of j-th indicator of i-th category using formula $\hat{I}_{ji}$;
   - m_i is the number of variables (indicators) of i-th category $\hat{I}_{ji} = f(I_{ji})$;
   - n is the number of categories, defining the Social Technology Index.

The values of all 3 values of the composite indexes are identified by means of corresponding formulas specified further. Values of the indexes fall into the range of real numbers [0,1]. To improve user perception, the obtained values of the composite indexes were transformed into a more attractive scale by multiplying the obtained values by, for example, 100 or 1000. As the indexes have just been introduced, any additional transformations are impossible until they empirically prove to match the actual data. When the actual data and the values of their indexes (or their evolution) differ essentially (in accordance with the corresponding criteria), changes in index defining formulas are necessary to lay down other leverage coefficients of the indicators (first type structural change) or include new indicators (second type structural change).

CI Capacity Index (CAI). In total, 20 exogenic variables, divided into six categories, are used to determine the *Capacity Index* (see Table 40). It is assumed that categories are not equally significant based on the present theoretical insights and empirical research results; however, all

variables used in these categories have the equal weight. *Capacity Index* is calculated by applying the following formula for categories (also see table in Annex 8):

$$CAI = 0,6\frac{DS + DF + PS}{3} + 0,4\frac{CM + DD + DI}{3},$$

Where:

DS is a degree of diversity in the source of ideas;
DF is a degree of diversity in engagement forms;
PS is efficiency of problem-solving;
CM is supply of critical mass ("swarm effect");
DD is a degree of decentralization;
DI is a degree of independence.

Table 41. Structure of CI Capacity Index

Category	Indicator (Exogenic variable)
Degree in diversity in the source of ideas	Percentage of females in the community and percentage of different nationalities and age groups
	Superadditivity (diversity in opinion, solutions, predictions, etc.)
Degree in engagement forms	Degree of participants (agents, members) outbound "sharing" activities (e.g., "send to a friend" or "share on Facebook') of community content by community members
	Realization of game-based approach
	Adaption for different age groups
Supply of critical mass ("swarm effect")	Total participation in site polls and surveys
	Total visits – the total number of times the site has been visited
	Unique visitors – the total number of different visitors the community has had
	Repeated visitors, the number or proportion of visitors who have visited the site more than once (ever, or over some period of time)
	Unique visitors/contributing visitors
	Conversion rate – the percentage of unique visitors who become registered members
	Number of contributions/contributors
Efficiency of problem-solving	Level of capacity for information processing, efficiency and timing with which group is able to solve problems
	Variety of problem-solving alternatives

Degree of de-centralization and interaction	Existence of diversity in forms for decision-making (group/ individual; evaluate/select/vote/consensus/averaging)
Degree of independence	Equal rights form participants
	Level of criticism
	Depth of problem analysis
	Existence of privacy policy
	Anonymity possibilities

The estimates of weighted coefficients of the category are estimated by expert assessment. As no numeric data have been collected until the present experiment, there are no possibilities to carry out statistical research and identify statistical significance of each indicator necessary to construct the indexes. Therefore, leverage coefficients of the indicators (or categories) are determined in view of the acquired empirical experience in defining indicator correlation significance.

CI Emergence Index (EI). In total, 14 exogenic variables, divided into five categories, are used to determine the *Emergence Index* (see Table 41). It is assumed that categories are not equally significant based on the present theoretical insights and empirical research results; however, all variables used in these categories have the equal weight. *Emergence Index* is calculated by applying the following formula for categories (also see table in Annex 8):

$$EI = 0,6\frac{DQ + AL}{2} + 0,4\frac{DC + AT + DM}{3},$$

Where:

DQ is a degree of development of new qualities in form of ideas, activities, structured opinions, competencies, etc.;

AL is an ability to adapt changes, development of improvements and learning processes within the community;

DC is a degree of development of shared structure and culture;

AT is adequacy in form of self-organization to community task;

DM is a degree of development of distributed memory system.

Table 42. Structure of CI Emergence Index

Category	Indicator (Exogenic variable)
Development of shared structure and culture	Existence of common community norms and regulations
	Existence of common community "mental models"
	Development of shared vocabulary and other infrastructure
Adequacy of self-organization to community task	Adequacy of type of leadership to community task (hierarchy, crowd, distributed leadership)
	Adequacy of task to a category of community (collaborative and competitive, centralized, decentralized)
	Balance between communities and individual objectives
	Degree of transparency
Degree of emergence of new qualities in form of ideas, activities, structured opinions, competencies, etc.	Number of new ideas, decisions, prototypes, activities, innovations, structured opinions, competencies
	Aggregated position (idea improved after comments)
	Diversity of created knowledge/products
Development of distributed memory system	Capability of "intelligent" problem-solving, i.e., the capability of utilizing the stored knowledge to solve problems
	Systemized relevant scientific and technological information in the field
Ability to adapt changes, ability for improvements and learning	Adequacy to socio-cultural context (local, national, global)
	Degree of development of improvements and learning processes within the community

The estimates of weighted coefficients of the category are estimated by expert assessment. As no numeric data have been collected until the present experiment, there are no possibilities to carry out statistical research and identify statistical significance of each indicator necessary to construct the indexes. Therefore, leverage coefficients of the indicators (or categories) were determined in view of the acquired empiric experience in defining indicator correlation significance.

Social Technology Index. In total, 22 exogenic variables, divided into six categories, are used to determine the *Social Technology Index* (see Table 42). It is assumed that categories are not equally significant based on the present theoretical insights and empirical research results; however, all variables used in these categories have the equal weight. Thus, the *Social Technology Index* (*STI*) value is determined applying the formula as follows (also see table in Annex 9):

$$STI = 0,4MD + 0,6\frac{EI + PS + DM + DA + SC}{5},$$

Where:

MD – media/design quality;
EI – external and internal networking/collaboration technologies;
PS – privacy and security assurance technologies;
DM – decision-making technologies;
SC – sharing/creating knowledge technologies;
DA – data aggregation and data access technologies.

Table 43. Structure of Social Technology Index

Category	Indicator (Exogenic variable)
External and internal networking/ collaboration technologies	Existence of mechanism for anonymous offering of ideas
	Existence of synchronous and asynchronous chat tools, open forums, etc.
	Provided access and integrated service to all devices (handhold, PCs, etc.)
Privacy and security assurance technologies	Existence of mechanism for providing secure and legal activities, protection of personal data
	Existence of mechanism of message control
Decision-making technologies	Existence of mechanism for collective brainstorming
	Existence of mechanism to vote/rank idea/solution
	Existence of mechanism to make decisions or conclusions
Sharing/creating knowledge technologies	Existence of mechanism to add value to content
	Existence of mechanism to generate feedback
	Existence of technological solutions for knowledge visualisation and organisation
	Existence of mechanism for idea classification
	Existence of mechanism for mass argumentation
	Existence of mechanism to create interests groups
Media/design quality	Degree of user friendliness, speed and convenience
	Quality of visualisation
	Level of development possibilities
	Design relation to task
	The perpetual beta (updating possibilities)
Data aggregation and data access technologies	Existence of mechanism to collect data
	Existence of mechanism to evaluate and analyse performance
	Existence of mechanism to share and re-use the data

The estimates of weighted coefficients of the category are estimated by expert assessment. As no numeric data on the observed phenomena have been collected until the present experiment, there are no possibilities to carry out statistical research and identify statistical significance of each indicator necessary to construct the indexes. Therefore, leverage coefficients of the indicators (or categories) were determined in view of the acquired empirical experience in defining indicator correlation significance.

Collective Intelligence Potential Index (CIPI). The Collective Intelligence Potential Index is designed around three different indices: *Capacity Index*, *Emergence Index* and *Social Technology Index*. The *Collective Intelligence Index* is the numerical value that expresses the mean of these three indexes. The *Collective Intelligence Index* formula is the following (see also tables in Annexes 8 and 9):

$$CIPI = \frac{CAI + EI + STI}{3}$$

At the current stage of the research, it is assumed that 3 indexes are equally significant.

Comparison of the CI potential in online communities. Descriptive statistics of the composite index is presented in **Table 43.** Analysis of the data indicates that the lowest value of *Capacity Index* within 11 Internet communities is 10,83, whereas the highest value is 71,67. The highest value of *Emergence Index* is 65,56, whereas the lowest value is 27,78. The highest value of *Social Technology Index* is 92, whereas the lowest value is 30.

Comparison of the indexes reveals that the highest mean has been found in CI *Emergence Index* –51,2145, with the lowest Standard Deviation being 13,44347. This shows that the distribution of data is the smallest, i.e., the values of the *Emergence Index* of CI within 11 communities are less dispersed. The biggest dispersion has been observed in the *Social Technology Index*, i.e., 20, 18640.

Table 44. Statistical analysis of 11 online communities according to Capacity Index, Emergence Index, Social Technology Index and Collective Intelligence Potential Index in total

	CI Capacity Index	CI Emergence Index	Social Technology Index	Collective Intelligence Potential Index
N Valid	11	11	11	11
Missing	0	0	0	0
Mean	26,8173	51,2145	50,9091	42,9809
Median	20,8300	55,5600	44,0000	41,7800
Mode	13,33[a]	55,56[a]	30,00[a]	23,24[a]
Std. Deviation	18,81635	13,44347	20,18640	15,63035
Minimum	10,83	27,78	30,00	23,24
Maximum	71,67	65,56	92,00	76,41

[a] Multiple modes exist. The smallest value is shown.

In Table 45, Pearson correlation coefficient r between Capacity Index, Emergence Index and Social Technology Index was calculated. The relationship is stronger if r value is closer to 1. If $r > 0$, this indicates a positive relationship between variables, when one random value is increasing, other values are growing, as well. If $r < 0$, this indicates a negative relationship, when one random value is increasing, other random values are decreasing.

Table 45. Correlation analysis of Capacity Index, Emergence Index, Social Technology Index and Collective Intelligence Potential Index of 11 online communities

		Capacity Index	Emergence Index	Social Technology Index
Capacity Index	Pearson Correlation		0,505	0,908**
	Sig. (2-tailed)		0,113	0
	N		11	11
Emergence Index	Pearson Correlation	0,505		0,573
	Sig. (2-tailed)	0,113		0,065
	N	11		11
Social Technology Index	Pearson Correlation	0,908**	0,573	
	Sig. (2-tailed)	0	0,065	
	N	11	11	

**Correlation is significant at the 0,01 level (2-tailed).

The correlation analysis results are presented in Table 44. With 99,9% probability, it can be claimed that there is a statistically significant correlation between *Capacity Index* and *Social Technology Index* and between *Emergence Index* and *Social Technology Index* (all *p*-values are < 0,01), i.e., all null hypotheses, asserting that Pearson correlation coefficients equal to 0, were rejected (Sig. 2-tailed) ($p < 0,01$).

A significant theoretical correlation between Capacity Index and Social Technology Index has been determined ($r = 0,908$). Linear correlation is positive, i.e., it is probable that community capacity to build CI potential is bigger if social technologies in the platform are better developed. On the other hand, a moderate statistically significant linear relationship has been found between Emergence Index and Social Technology Index, as $r = 0,573$. However, there is no correlation between Capacity Index and Emergence Index ($r = 0,505$) (as (Sig. 2-tailed) $p = 0,113$, $p > 0,01$).

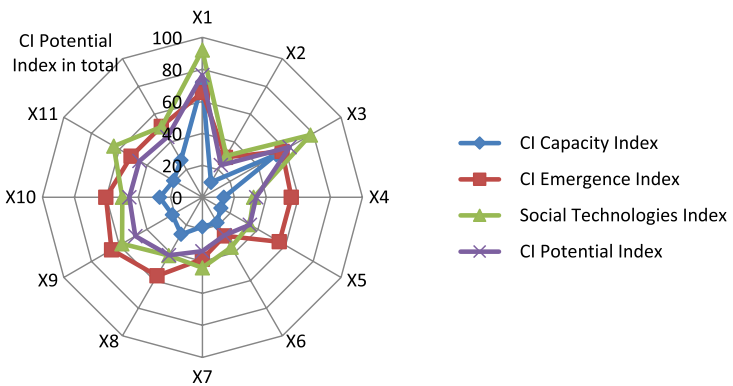


Figure 53. Graphical comparative analysis of 11 online communities according to Capacity Index, Emergence Index, Social Technology Index and Collective Intelligence Potential Index (see also Annex 10)

Analysis of 11 online communities is graphically described in Figure 53 according to their *Capacity Index*, *Emergence Index*, *Social Technology Index* and *Collective Intelligence Potential Index*. Numeric values of 11 communities are presented in Table 46 and Table 47.

Table 46. Indexes of 11 online communities analysed during the experiment (see also Annex 10)

Index / Community	**CI Capacity Index** *(CAI)*	**CI Emergence Index** *(EI)*	**Social Technology Index** *(ST)*	**Collective Intelligence Potential Index** $CIPI = \frac{CAI + EI + STI}{3}$
X1	71,67	65,56	92,00	76
X2	10,83	28,89	30,00	23
X3	53,33	57,5	78,00	63
X4	13,33	55,56	32,00	34
X5	13,33	55,56	34,00	34
X6	18,33	27,78	36,00	27
X7	18,33	38,61	44,00	34
X8	26,67	56,67	42,00	42
X9	21,67	65,56	58,00	48
X10	26,67	60,28	50,00	46
X11	20,83	51,39	64,00	45
The mean value of the Index	26,82	51,21	50,9	43[2]

Table 47. Leverage coefficients of experimentally analysed platforms indicators (see also tables in Annexes 8 and 9)

CI Capacity Index Dimension	**Value of Dimension**	**Indicators**	**Value of Indicator**
Capacity for creativity	32,95	Degree of diversity in the source of ideas Degree of diversity in engagement forms	43,18 22,73
Capacity for aggregating knowledge	40,91	Degree of interdependence Degree of adequate supply of critical mass ("swarm effect")	N/A 40,91
Capacity for decision-making and problem-solving	22,73	Degree of decentralization Efficiency of problem-solving Degree of independence	18,18 15,91 34,09
CI Emergence Index			
Potential for self-organization	53,41	Adequacy in form of self-organization to community task Degree of development of transparent structure and culture	70,45 36,36

Intensity of emergence	38,26	Degree of development of new qualities in form of ideas, activities, structured opinions, competencies, etc. based on distributed memory system (Web intelligence) Development of distributed memory system	37,88 38,64
Potential for adaptivity	68,18	Adequacy to socio-cultural context (local, national, global) Degree of development of improvements and learning processes within the community	81,81 68,18
Social Technology Index			
External and internal networking/ Collaboration technologies	54,54	Existence of mechanism for anonymous offering of ideas Existence of synchronous and asynchronous chat tools, open forums, etc. Provided access and integrated service to all devices (handhold, PCs, etc.)	54,54 27,27 81,81
Privacy and security assurance technologies	45,45	Existence of mechanism for providing secure and legal activities, protection of personal data Existence of mechanism of message control	45,45 45,45
Decision-making technologies	36,36	Existence of mechanism for collective brainstorming Existence of mechanism to vote/rank idea/ solution Existence of mechanism to make decisions or conclusions	36,36 27,27 45,45
Sharing/ Creating knowledge technologies	51,51	Existence of mechanism to add value to content Existence of mechanism to generate feedback Existence of technological solutions for knowledge visualization and organization Existence of mechanism for idea classification Existence of mechanism for mass argumentation Existence of mechanism to create interests groups	63,63 27,27 81,81 54,54 27,27 54,54

Media/design quality	52,72	Degree of user friendliness, speed and convenience	63,63
		Quality of visualisation	63,63
		Level of development possibilities	27,27
		Design relation to task	81,81
		The perpetual beta (updating possibilities)	27,27
Data aggregation and data access technologies	60,60	Existence of mechanism to collect data	81,81
		Existence of mechanism to evaluate and analyse performance	54,54
		Existence of mechanism to share and re-use the data	45,45

After having determined the values of composite indexes, a possibility to analyse and compare communities occurs. However, the research is limited to the comparison of the communities composing the research sample. In the absence of an index that was equally obtained, designed and tested in another territorial context, the comparative value of the outcomes of this research cannot be established. CIPI index calculation methodology will be adapted to the network environment and will create possibilities to accumulate further empirical research on CI potential in the online communities. Increase of empirical data will condition increase of research data reliability and the validity of a newly constructed instrument.

6. SYSTEM DYNAMICS MODEL FOR DEVELOPING COLLECTIVE INTELLIGENCE IN ONLINE COMMUNITIES

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Owing to the advancement of information and communication technologies, new initiatives of citizens, such as new forms of social collaboration, have evolved, which have been changing social life and the attitude to communication and collaboration. One of them is online communities which have started to unite people online, even though they may never meet in the real life. Despite the highly diversified goals of the existence of online communities, they are becoming an integral part of the social environment, making a significant impact on society and the state. Due to enormous possibilities, such as fast access to the remote members, the longevity of the records of discussions, quick and simple availability of the members, online communities are even becoming predominant over real communication. The knowledge, accumulated within an online community, is changing social environment and their agreements may be valuable while making decisions, important for the whole society; they can even be transferred to state governing.

Regarding the distinctive features of the online community, a very great variety of them can be noticed. Some online communities are concentrated only on everyday interests of their members and well-being very locally (Chan et al., 2010), while others set themselves more meaningful strategic objectives, more orientated towards society and the changes of its well-being, thus, as if searching the ways to communicate with state institutions (Meijer, 2012); still, the communication of others is guided by a narrow professional interest (Yuh-JenChen et al., 2012; Demiris, 2006). Moreover, considerable changes can be noted in the process of their development due to essential differences in their objectives. Some communities exist for a long time and attract great numbers of people, while others function for a considerably short time and

cease existing even during their first stage of evolvement. It is not always easy to foresee the prospects of success of such communities. The high speed of the development of online communities and the promised social benefits arouse the wish to know how to encourage online communities to organize themselves and function for a longer period of time as well as how to become productive regarding not only the members, but also how to be socially active and responding to the improvement of the issues exciting the whole society. Therefore, it is imperative to understand the criteria of success of online communities and to know the factors bringing the community together and determining the reasons for the community to be productive for a protracted period of time.

If we considered such communities, which manage to become valuable not only to their members, but also to society beyond the online community, successful, such an online community would usually be based on Collective Intelligence, i.e., such a community produces more knowledge than a separate member would produce. Thus, Collective Intelligence becomes the good which is likely to contribute to the solutions of complex and multi-dimensional problems. Therefore, if we managed to create the model explaining the longevity of online communities and comprising the interaction of the members of the community and the cycles of the accumulation of knowledge, we would be able to forecast the formation of Collective Intelligence. Simultaneously, there would be realistic prerequisites for creating inexpensive, meaningful and functional instruments of civil engagement in state governing.

The aim of this chapter is the creation of the model explaining the emergence of Collective Intelligence in online communities. The model has the objective to help online communities to create necessary conditions for fostering Collective Intelligence, as only having such conditions online communities can remain valuable for their own community and the wider public.

6.1. Theoretical Concepts of Success of Online Communities

According to the widely accepted definition, online communities are groups of people who communicate and exchange ideas with the help of computer networks and other software (Rheingold, 2008). In order to identify the success factors of functioning of online communities, it is

necessary to perceive what factors preconditioned the evolvement of the phenomenon of online communities, for what reasons they are created and how they function.

Regarding the development of online communities, it is possible to distinguish three main conditions for their existence:

- The contents: the object of collaboration and communication of online communities and the contents of conversations. The contents are revealed through the ability of the members to integrate their opinion, experience, interests and wishes, through the ability to creatively express thoughts with the focus on social problems. The aim of discussions of online communities is the knowledge as the highest form of integration of data.
- IT solutions: the use of different technological solutions. These solutions facilitate collaboration and communication, encourage the dissemination of knowledge and support the exchange of ideas. IT solutions allow people to create such collaboration environment which could reflect social relations of cooperation and strengthen them.
- Management: operational effectiveness is based on the management of the communication flows. This management is focused and directed to the creation of additional added value, such as the accumulation and sharing of knowledge. It is the essence of the creation of Collective Intelligence.

It is understandable that the sets of criteria of success of online communities vary and not all of them occur at the same time. However, there is such a fundamental set of important criteria which determines essential processes taking place among the members of the online communities. In order to substantiate these processes, it is necessary to refer to several scientific concepts which could describe the aforementioned conditions. They are the theories of management, Collective Intelligence and social networks describing the processes which take place inside online communities.

Knowledge management in online communities. Knowledge management is a relatively new concept in Management science. The research began with the need to systematically describe the processes of knowledge structuring, storage and transfer within an organization and, thus, to accelerate and simplify the transition from one project to another (Nonaka et al., 1995; Pfeiffer and Sutton, 1999). The need for knowledge

management increased with the realization of the fundamental differences between the need and use of data as well as information and knowledge in the activities of an organization. The data is raw information which always exists in every message. Arrays of information are formed having grouped the data. The highest degree of complexity is the task of determining the ties among the current arrays of information (joining facts, data and information by links) and, thus, creating the most valuable elements of management – knowledge (Nonaka et al., 1995). Theoreticians and practitioners distinguish several forms of knowledge. One of them is tacit knowledge. It requires management efforts to grasp it and later to formalize it in order to be able to use it. Tacit knowledge is hidden in cultural differences, often deliberately unrecognized, not formalized, not verbalized and even undocumented. This knowledge is important in different innovative processes, especially when one encounters a phenomenon for the first time and does not have any historical experience. While creating Collective Intelligence in online communities, most frequently it is the tacit knowledge that is attempted to be grasped. IT solutions serve for the formalization of tacit knowledge; they structure the stages of knowledge management, analyse facts and massive arrays of information and, thus, facilitate to create formalized knowledge faster and more efficiently. A good example of management of tacit knowledge is professional communities where collective communication of a group stimulates knowledge sharing and at the same time creates greater trust among the members and, thus, develops new contents (Lesser et al., 2011). Interaction in professional communities is led by professional contents and their main objectives are knowledge management: the members seek to share their experience and produce new professional knowledge together.

Having defined the types of knowledge, it is imperative to define the cycles of knowledge management. Some authors highlight the user of knowledge, while others focus on the type of knowledge or the purpose of using knowledge. While analysing online communities, the stages of knowledge transformation are significant (how the types of knowledge change during knowledge management). Thus, the stages of knowledge management are formed (Dalkir, 2005):

1. Knowledge creation and capture. During this stage, it is important to establish the source of information and ideas (Mendes et al., 2004).

2. Knowledge sharing and dissemination are related to personal ties and mutual trust (Hess, 2007). The higher is the degree of trust, the more efficient is knowledge sharing.
3. Knowledge acquisition and application is related to the interpretation of existing knowledge and further learning when it is used for the solution of a particular problem and for making specific decisions.

Moreover, it is possible to distinguish additional stages, such as knowledge enrichment or encouragement of feedback in discussions while supplementing the perception of a phenomenon with additional knowledge.

Thus, knowledge management solves the issues of the contents of online communities while answering the essential question: what is the purpose of creating an online community?

Social networks and ties in online communities. It is possible to analyze online communities as an online network of people in which the resources of every member become common resources of the community and the values are perceived equally or very similarly. The concept of the network is transferred from the paradigm of social capital (Wellman, al., 2001) which describes an online community as an interaction between the behaviour of its members and knowledge sharing during social networking. During online communication, such communities share their feelings and mutual interdependence, create trust and share the same values in discussions about a particular object. Resources of knowledge and experience become common in such a community.

The origins of the theories of social networking can be traced back to the research of social interaction in 1969 (Blau, 1964). Social networks and their relationship provide a social environment in which communication takes place. Information technologies facilitate its implementation. In such networks, information is transmitted more smoothly. In naturally emerging networks, the structure of the network and the position of its members become the source of information about how information spreads online. Thus, the position of every member in the network, the frequency of interaction and the numbers of two-way communication have a direct connection with the preconditions of the emergence of Collective Intelligence: the information about what the members of an online community know, the possibility to reach any member of an online community at any time, the production of knowledge in the activities of

an online community or continuous learning having long-term relations (Cross et al., 2002). These conditions create trust which leads to the production of knowledge and motivation for collaboration as well as raise the willingness to share existing knowledge.

Collective Intelligence in online communities. With more technical possibilities to strengthen social interaction, there are more possibilities to structure communicational ties among the members of an online community. Flow structuring can have concrete aims, e.g., to share existing knowledge. However, it must be aligned with the needs of flow spontaneity. Thus, the preconditions for the production of new knowledge evolve and the environment for the emergence of new knowledge of a seemingly known issue, unknown before, is formed.

The process of the emergence of new contents and knowledge is analyzed by the theory of Collective Intelligence (CI). Collective Intelligence results from combining the sciences of socio-biology and politics as well as joining the theories of social capital, management of consensus, voting and social media. CI is understood as collective attempts to produce knowledge which arises from the integration and synthesis of current skills and talent. In other words, CI emerges from the capitalization of knowledge management. The main precondition for the emergence of CI is interaction within a group. It is group intelligence that emerges from the interaction of a considerable number of individuals while collaborating, competing with one another and joining their efforts in order to solve a problem or make a decision.

The genome of Collective Intelligence has become a widely accepted concept which has highlighted four elements which predict the formation of the principles of Collective Intelligence: aims, incentives, structure and participants (Malone et al., 2009).

It is understandable that in order to manage CI processes, it is imperative to perceive main CI properties and prerequisites when CI is being formed most efficiently. CI is characterized by the properties of a dual nature; some of them are enabling properties, while others are defining ones (Schut, 2010).

The following are CI enabling properties:

– Adaptability. The structure of an online community changes, it seeks to adapt to a new environment even in those cases when the members themselves do not change separately.

– Interaction. It is important which members mutually communicate, in which topics they are interested, how often they are engaged. Interaction itself and its frequency generate additional information flow.
– Rules. An online community sets its own rules which ensure the activity of the community, encourage other actions of the online community and later determine the moment of the emergence of CI.

CI defining properties are as follows:

– Local-global medium. Adaptability of CI may occur at both individual and global level of each individual as well as at the level of all the online community; therefore, both local and global (external) medium of an online community has a direct influence on the formation of CI.
– Chance. Despite the wish to control the processes of CI, an element of chance cannot be discarded. Quite frequently, chance becomes significant while explaining some unsuccessful processes. Accident is no less important for a moment of luck.
– Diversification of participants. It is important to bring people, considerably different from one another, together in order to produce CI in an online community, i.e., people with diverse competences, life experience, education and other significant differences are brought together. Such people are likely to have more diverse attitudes to the same issue in question and a different level of creativity may induce unexpected associations.
– Formal/informal structure of an online community. It is important to create a relatively formalized structure with the elements of informal structure within the framework of the rules of the online community in order to be able to structure its activities. Rules encourage the members of the online community to behave similarly, while an informal organization retains the diversification of their abilities while using the best of their resources.
– Modulation and coordination of tasks. An informal structure of an online community seems to presuppose the need not to structure discussions; however, grouping discussions and tasks, setting time limits, grouping topics and raising them subsequently contribute to the increased probability of CI.

- Communication density. Communication density is understood as frequency of communication and the number of recipients over a fixed period of time. Thus, an uninterrupted communication density, regarding not only its time, but also its contents, is important for the production of CI.
- Shared vocabulary. After a long-term and constant interaction, a common vocabulary for defining the same concepts is formed among the members of an online community; it stimulates better communication and a higher degree of trust which later leads to unexpected and innovative solutions.
- Awareness. Timely awareness of the processes taking place inside an online community creates an integrated picture of the online community inside each member. Such awareness is necessary for the formation of the identity of an online community; it becomes an external picture of the online community.
- Learning. There is an ongoing learning within an online community as regular contacts create the prerequisites for taking over the knowledge of other members without additional efforts.
- Power of edge. The members of the periphery of the network have inexhaustible potency when their knowledge encounters the knowledge of other members.

Regarding formalized forms of CI in practice, theoreticians distinguish three types of CI in accordance with predominant aims:

1. Cognition. This type includes different gatherings of future predictions and platforms for market solutions.
2. Cooperation. Cooperation is best expressed in networks of trust and communities of open source developers.
3. Coordination. Coordination works best in groups which activities are directed towards coordination as well as in specific groups, such as professional societies.

In accordance with this division, online communities are most satisfied with the aims of coordination; however, such aims as cooperation or cognition are also present in almost every community.

In conclusion, success factors of the online communities could be analysed having grouped them according to the localization of their occurrence (see Figure 55).

1. Online communities seek knowledge. It is explained by the paradigm of knowledge management; it also answers the question why online communities are created.
2. Members of the online communities seek to satisfy the needs of social interaction; therefore, they join networks in which knowledge is transferred and stored in a specific way. The theory of social networks explains in which social medium online communities are being formed.
3. Meaningful interaction of the members of the community creates the contents and knowledge of an entirely new quality, the contents and knowledge being sought by the members of the community. Collective Intelligence explains how online communities are formed and how they satisfy the interests and needs of the members.

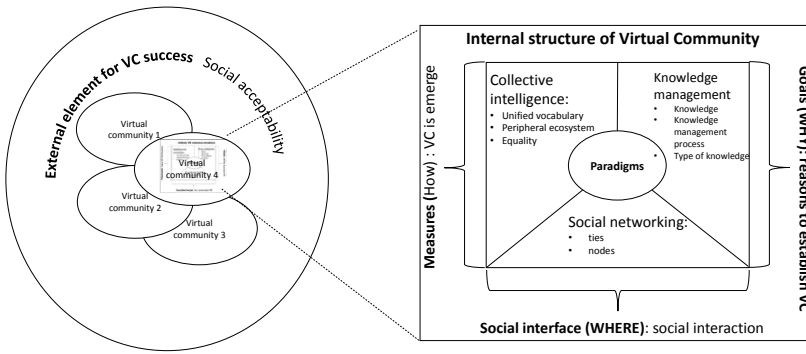


Figure 54. Conceptual grounds of success factors of online communities

Moreover, even though online communities communicate inside, their success also depends on external factors which can either maintain the existence of such communities or impede it.

Successful development of online communities depends on external conditions and environment which, while recognizing the significance and meaning of online communities, can encourage their development. Likewise, in the absence of external support, online communities are not created or are not able to spread knowledge outside their boundaries. Sometimes, it might be difficult to establish what that decisive factor is – whether online communities influence the public or vice versa. Quite

frequently, successful development of online communities accidentally coincides with the development of a related sector. For instance, the growth of an online community of computer games was supported by the market of these games (Hsiao et al., 2012). Thus, it is important to distinguish a decisive external factor, which influence is the most significant for the productivity of the online communities.

Social acceptability of the activities of online communities arising from the outside. The concept of social acceptability is frequently used to speak about mobile equipment, IT technologies and new solutions. However, this concept sometimes lacks detail and clarity (Montero et al., 2010). Meanwhile, for consumers the concept of acceptability is more detailed; it becomes significant when they are offered a new innovative service or a type of activities, e.g., an online community. In this case, consumer acceptability is described through utility, usability or cost (Shackel, 1991).

Social acceptability is an inconsiderably broader concept than consumer acceptability, supplementing the dynamics of the latter one with the element of the ties of mutual interaction, which in the public consciousness gives meaning to a new technology-based entity as being important to use.

Another trend defining the concept of social acceptability in scientific research is the evaluation of acceptability of new political decisions. Thus, social acceptability is more and more frequently viewed as one of significant value dimensions (Schuitema et al., 2010; Christoph et al., 2008; Jones et al., 2012). Regarding political acceptability, perceived political efficiency (Eriksson et al., 2008) and individual potential effects on individuals (De Groot et al., 2009) become significant aspects preconditioning acceptability of all the policies in society.

Concerning the dynamics of values, five areas should be taken into consideration: a) values change over time; b) different groups of people have different values; c) a set of values can describe one and the same phenomenon in society; d) there are numerous combination situations between values, changing attitudes and new future behaviour; e) values determine what managerial decisions a person will choose for his or other people's activities (Ives et al., 2014).

The concept of social acceptability, applied for online communities, is not an independent, but rather a derivative one, depending on other fundamental factors of the environment determining the dynamics of

the contents. Social acceptability is part of the system of values, thus, it is characterized by all the dynamics, which is typical of the formation and preservation of values. Dynamic dependency on external factors does not frequently allow social acceptability to be analysed in a static state. In conclusion, social acceptability substantially depends on several factors of superposition:

- cultural environment (in which medium online communities exist);
- demographic characteristics of a group of consumers of innovations (e.g., age; online communities are much more easily accepted by younger consumers; however, their prevalence is increasing);
- time (the connection of the creation of online communities and the debated social topics facilitate the acceptability of online communities);
- type of interaction (cohesion of interaction proposed by online communities determine the rate of social acceptability);
- engagement of an individual or the public;
- the stage of the development of innovation at which social acceptability is analysed (the stage of the development of the online community and maturity of the community can block or support ideas generated inside the online community);
- the cost of innovation (as long as software maintenance of the online community is expensive, it is difficult to reach the community);
- reliability of innovation (information medium of the online community and its functionality become the guarantee of the online community).

Cultural medium can either impede or accelerate technological innovations. In a certain environment, social acceptability may be formed over a longer period of time. Some innovations become more acceptable when they become part of other innovations, additionally substantiating their benefit and value for the consumer. Thus, with time, with the emergence of new innovations, earlier generated innovations become more acceptable, they are applied more extensively, resulting in greater experience regarding their application.

If users of innovations were divided into groups according to acceptability of innovations, research would show that one part of society accepts innovations more easily, while the other one – with more difficulties and reluctance. According to the Roger model, there is much less innovators

in society (Roger, 1995); therefore, innovations are difficult to implement, while new and controversial ideas have to wait for a long time till they are "grasped" by the public. Thus, innovative activities can be delayed if there is no support and understanding from the public. Social acceptance is formed much earlier if the user's environment begins to implement the innovation and the benefit of the innovation is manifest. Conversely, if the observer does not see any added value, the innovation is not readily accepted.

Social acceptability is considerably influenced by the creation of the rules of operation. If new rules are directed towards the compulsory requirement to change conventional behaviour, they are less readily accepted by online communities. Such trends are frequently manifested in environmental policy while searching for innovative environmental decisions. The measures, which prohibit certain behaviour, demand to change it and are supplemented with fines, are less acceptable than those which create natural prerequisites for the change of behaviour without any fines as well as encourage civic engagement (Garling et al., 2007). At times, even imperative rules may be acceptable if the public perceives their inevitability and the support of the larger part of the public and is sure that other members of the public cannot avoid such rules (de Groot et al., 2012). Thus, it is more acceptable to online communities that they are supported by a larger number of members not only internally, but also externally.

6.2. Methodology Designed to Develop the Model of Collective Intelligence Inside Online Communities

System dynamics. System dynamics is frequently used to describe dynamic system changes determined by the structure of the system. It is computer modelling which seeks to create management rules and decisions while simulating possible consequences of the action. The first successful attempt was made by Forester while modelling the expansion of cities (Forrester, 1969). The success of system dynamics laid the foundations for the application of this technique in any sector of activities. At present, this modelling is the ground for the decisions of systemic problems in the sphere of health care (Trochim, 2006), police activities (Carter et al, 2011), management of natural resources (Mendoza and Prabhu, 2006; Dreyer and Renn, 2011), management of projects (Lyneisa et al. 2007) or the research in the addiction to computer games (Park et al, 2010). It is only

a small part of fields of research. Further research seeks to apply system dynamics to the decision of complex problems in political life when there is a need to combine a multi-dimensional nature of a phenomenon with a possible long-term effect for the purpose of prediction.

The present modelling method uses two variables: 1) stocks, the quantity of the contents of which changes due to external incoming and outgoing flows in stocks; 2) flows (as a variable velocity), which are regulated by filling stocks. When the system is described with the help of a large number of variables, it is possible to trace the nonlinear dependencies which can essentially change the desirable operation of the system into undesirable one quite unintentionally (Sterman, 2001). Then, the objective is to identify the most sensitive element of the system or area and to create such rules or structure so that the system would automatically function in the desired direction. Such operation is based on feedback. Only such a system which has interdependent elements that are situated in a closed feedback loop could be modelled, corrected and influenced (Vennix, 1999). Significant added value is possessed by the so-called small dynamic models which combine a limited number of variables, i.e. 7-8 feedbacks unite several stocks and thus conceptually describe the operation of the system and, with the help of the aggregated model, describe a complex system as simply as possible (Ghaffarzadegan et al., 2011).

While developing models, involvement, based on engagement, is frequently used; during the development of the model the interested persons actively participate in its creation by testing it (Mendoza and Prabhu, 2005). Thus, the components and functionalism of the model could be determined more accurately while the structure of the model becomes more understandable to those people who intend to use the model in making management decisions in practice. Such engagement becomes significant only with the formation of meaningful social ties.

Empirical data. The system dynamics model of Collective Intelligence emerging in online communities was being formed on the grounds of the superposition of empirical data of different nature. Data of monitoring of everyday activities of online communities were supplemented by explanatory data of the qualitative research and based on quantitative statistics collected during the research.

Monitoring. 28 online communities functioning in Lithuania were chosen as the objects of monitoring. Communities for monitoring

were selected according to the criteria significant for modelling. Efforts are being made to select such online communities as the study sample which could represent communities in every stage of their development and at different levels of popularity in order to have a greater variety of practices for modelling. This variety will insure dynamic repeatability of the parameters and processes of the monitored online communities. The controlled criteria of selection were: the size of online communities, the intensity of interaction, activity of online communities, and the variety of discussed issues. Such online communities which have social activity and orientation to the public interests as their objectives as well as declare the wish to affect process of public administration outside online communities were the priority of the study sample. However, the online communities which have educational objectives, such as the promotion of sustainable behaviour, orientation to the ecological aims or the dissemination of knowledge, were also included. These online communities corresponded to the requirements of the diversification of topics. It is likely that the public spirit, the interest of participation in state governing, socially orientated communication and the contribution to development of democracy guarantee that online communities stand far from private and rather narrow personal interests. All this motivates the members of online communities to think globally.

Quantitative research. During quantitative research a public survey about practices of online communities and the publicity of their activities was carried out. This research facilitated establishing connections, variables and links between them, reflecting the impact of the external world on success of online communities. The research results indicated that the information about online communities is scarce and the general public itself is reluctant to become engaged in such communities.

Qualitative research. In order to create the conceptual structure of the system dynamic model and to establish the main feedback loops, it was important to know the opinion of the leaders and activists of online communities and their view to the factors making the greatest impact on the success of a particular online community. In interviews, the main focus of attention was on the specific links of factors for the emergence of Collective Intelligence, on the use of management rules which, to their mind, are the most significant ones. The contents of ten semi-structured interviews became empirical input for modelling and allowed us to

formulate the initial list of variables of online communities as well as to link them to meaningful loops.

6.3. Trends of Development of Online Communities in Lithuania

Success of the existence of an online community depends on the internal structure and external processes in society. In that case, the members of communities more or less identify themselves with the community while sharing their own resources and seeking to implement individual objectives of the members. Therefore, in order to create the system dynamics model, it is imperative to perceive practices of online communities, the elements of cycles of the knowledge existence and to find the links between any other significant elements. Thus, selected different online communities are a very good sample to create the model based on differences of online communities and to turn those differences into dynamic changes.

The monitored online communities are considerably different; however, they are united by social orientation towards the problems of society and the wish to create a better environment around them. However, the majority of them does not extensively use the potential of Collective Intelligence and is frequently limited by rather narrow group interests or even become an instrument of individual self-realization or marketing. However, in the overall study sample of the research, such online communities become a perfect visual proof of the fact that it is not possible to create a real productive online community, functioning for a long time, if some specific elements of Collective Intelligence are being ignored.

Having reviewed the empirical data on the online communities of Lithuania, it should be emphasized that more successful and longer functioning online communities are more frequently orientated towards social phenomena and external problems of an online community. Moreover, such online communities often use integrated and sophisticated IT solutions. In addition, such online communities are more numerous; their members are more active, they connect to the system more frequently and seek more contacts, they communicate and collaborate among themselves, more actively share attitudes and get more involved in everyday life of the online community. It is understandable that the members of such communities demonstrate a greater enthusiasm during interviews. Quite a few of them mentioned that the main motivator keeping them in a team was the social significance of their activities, most often associated

with the external influence of the online community and the transfer of ideas to the outside. It is social discourse that becomes that motivator which not only keeps them identified with the online community, but also encourages new members to join them and to justify their expectations for a long period of time. Another motivator is the sense of security being on the platform, information openness, flexibility and interactivity of the programme, which inevitably create a greater affection and satisfaction. Hereinafter, the main groups of online communities will be discussed.

Online communities for better state governing. Those online communities which are concentrated on state governing problems are most frequently successful owing to the moderator's attempts to raise controversial issues. The examples of such communities could be Lietuva 2.0, Aš Lietuvai, viesai.lt, santalka.lt. (*Lithuania 2.0, I for Lithuania, publicly.lt, coactivity.lt*). Such communities exist due to enthusiasts. They discuss the issues which usually appear on front pages of the media. As these communities only discuss issues but do not use IT solutions for analysis, there is no tangible product, visible to the public.

Identification of the organization with the online community. Quite often, the objectives of online communities coincide with those of the organization which has initiated the online community. Such communities seem to have become an instrument for the creation of the network of the interested persons; they are less frequently engaged in more significant aims to create Collective Intelligence. They are often quite selfish in the sense that they rarely focus on what their members of the community need; furthermore, they seek to realize short-term goals of the organization. It is most frequently an online community functioning as a forum for discussions; its members do not necessarily identify themselves as members, they are rather users who join the community only for the solution of a particular problem or issue; having found the answer, they are not likely to return to the community.

Communities, which are supported by organizations, are mainly established with a view to implement the mission and goals of the organization and they may vary according to the type of organizations. The activities of the online community, like those of the organization, can be predetermined both by commercial interests (e.g., What's Going on in Kaunas) and non-profit interests (e.g., Social Business, Smart and Green City, Transparency Line, Bepart). They can also be an instrument for the implementation of duties of state governing (Community of the Vilnius Municipality).

Online communities, having commercial goals, frequently do not indicate the number of their members; interactive possibilities are rather limited for the members. However, this is not easily identifiable, the communities look attractive from the outside; yet, their vitality is supported by the moderator's attempts. However, these organizations are not viable as they, in fact, are not the ones they pretend to be. Some of them balance between legality and the violation of rights, e.g., Ututi. Another example could be *Minčių sodas* (The Garden of Thoughts) which cannot find new followers.

Those online communities, which objectives are orientated towards their interested people and the members, tend to become more vital, even though their activities are mainly focused on the implementation of the direct function of the organization. An example could be the community of the Vilnius Municipality (e.miestas). Here, each resident can leave an urgent message about the situation in the city. Such a community begins to function as an additional communicative channel between residents of the city informing the municipality of actual needs of their community.

Intelligence is rather limited in these online communities owing to one-way communication. They have a significant added value as, due to the stability of their activities, links based on trust appear between the members, they become more known, the exchange of current knowledge becomes more rapid, and there are possibilities for unexpected solutions.

The role of the leader made more prominent. Another group of online communities is based on one or several enthusiasts who bring together the community around them and constantly take care of its vitality. An extreme case of such communities is a community of one person (e.g., bank of ideas) which could be called an internet blog; however, according to the nature of its information and goals, it seems to be more than a blog as it communicates with interested persons and seeks feedback.

Sociality of leaders based on competition. Some communities are centred on a group of leaders who have attractive human qualities, are real professionals, mainly educated abroad (e.g., Business Brother, Global Lithuania Leaders). Such emphasis on the leaders seems to assert that their thoughts and ideas are the most correct and they could propose new ideas in state management. In such communities, there seems to be competition between the idea of the leader and the ideas of the members of the periphery; however, their ideas are not directly exposed.

Professional online communities. Conventional online communities are based on professional interest. Incidentally, their vitality depends on the critical number of enthusiasts. One of them, e.g., Professional Community of Teachers, was not virtually active during the research period, while the Union of Young Scientists corresponds to almost all classical elements of online communities. Even though the motive of the activities of such communities is easily perceptible and it is not complicated, the wish to belong to a community which has an organisational structure maintains the enthusiasm of its members.

6.4. The Conceptual Model of Online Communities Based on Collective Intelligence

The assumptions of the conceptual model. The conceptual model of online communities based on Collective Intelligence (Model) is formed on the basis of the most important variables which contents have been analysed and described in several theories: social interaction and social networks, Collective Intelligence and management of knowledge, while the model itself, uniting the results of several paradigms, creates a model explaining the interaction inside online communities. Each theoretical paradigm enriches the Model with significant elements and additional interaction:

- The theory of social interaction draws compulsory structural elements of the interaction between the members of online communities. In that case, the structure of the model of Collective Intelligence must reflect structural elements typical of social networks, such as the size of groups and the network, frequency of interaction, the time given to the formation of interaction, the diameter of the network and centralization.
- The theory of knowledge management encourages creating reverse links of knowledge cycles with a view to the level of the maturity of knowledge, e.g., loops of dissemination of knowledge, circle of knowledge creation, the chain of the use, transfer or sharing knowledge. The theory of knowledge management suggests the main element of the Model – knowledge, and the strengthening reverse link – production of knowledge.
- The paradigm of Collective Intelligence recommends taking the following factors into account: the dimensions of the group (size and diversification), dimensions of topics (diversification

of topics, modularization of queries and grouping as well as interactive analysis), decision-making skills and extent.

Even though theoreticians use the concepts of Collective Intelligence, collective knowledge and collective wisdom synonymously (Horaguchi, 2014), in this Model, the authors would like to distinguish the concepts of collective knowledge and Collective Intelligence. If collective knowledge means the level of knowledge of the subject which describes facts, relations between facts and fills them with meaningful associations arising from interaction, then Collective Intelligence is a way and a collection of actions and behaviour which lead to the emergence of collective knowledge in a particular collective medium while applying particular means of interaction which facilitate the formation of collective knowledge. Thus, while creating the Model, the main presumption was that the most significant objective of an online community, which attracts people and keeps them together, is the knowledge; its shortage is felt by every individual member of the online community outside the community until he joins the online community.

As the research shows that new members of online communities always find themselves in the community centre, it is imperative that as early as possible new members would feel trust and comfort regarding the accumulation of new ideas. In that case, the motivation of a new member would be constantly strengthened and supported by a variety of feedback-building measures.

Variables of the conceptual model. The model of the emergence of Collective Intelligence in online communities is represented by causal loop diagrams which best highlight the dynamic mutual interaction of factors of Collective Intelligence (see Figure 53). There is an attempt to relate collective knowledge into causal loops, this knowledge being the product (the starting point) of Collective Intelligence. Its creators are the members of the online community (intermediate effect element), while their attempts are based on individual interests to relate themselves to the community, to lay the foundations for the emergence of new knowledge and to create satisfaction assumptions for acting together (aspirations, expressed interaction between significant elements is, in fact, the ultimate result of an online community).

Technological solutions, though undoubtedly understood as an inseparable cause and means of the emergence of Collective Intelligence, are not even distinguished as an element of Collective Intelligence in online

communities as their realization and application are preconditioned by other causes. Technological solutions, such as support of interaction, interactivity, protection of data and the security of processes, grouping and analysis of discussions, multilayer environment of discussions, are vital for the formation of Collective Intelligence. However, IT solutions are constantly improved and the abundance of them prevents them from being transferred to the model. IT solutions have to be chosen in such a way that the operation of the main elements of the model of Collective Intelligence would be insured, e.g., technological solutions are mainly responsible for the formation of trust (lower barriers of communication for reaching a particular member of the community, conditions for comments and expression of one's positions and limit in time as well as technical possibilities). If IT platform impedes communication, limits its speed, frequency, the contents of discussions, the number of messages, it hinders the spontaneity of the interaction of the members of the community; this in itself reduces trust in the system and alienates members from one another, i.e., average distances between members become longer. Thus, one of the additional values of the model is to reveal the main elements of Collective Intelligence in such a way that the choice of IT solutions would be simple and more explicit.

1. **Size of an online community.** As the emergence of Collective Intelligence depends of the characteristics (size, variety of members) of group members, this element of the model acquires the properties of a stock. The members of an online community are the main resource of Collective Intelligence; their qualitative parameters determine a certain level of the emergence of Collective Intelligence. It is the most sensitive element of the Model, which can be described by the properties of critical mass and critical composition.
2. **Social acceptability.** Social acceptability has the meaning of the performance of an online community; it balances the internal and external coherence. This variable has a direct impact on the motives of new members for joining the community. Social acceptability can be regarded as an internal measurement indicator of the activities of the online community, this indicator being pointed outwards. It indicates that:

– intelligence, accumulated by an online community, is attractive to external communities;

- processes of dissemination and sharing the knowledge processes take place openly and without interference;
- the external society is ready for collective knowledge and feels the lack of a new perception.

The understanding of the meaning of social acceptability results in the emergence of an additional assumption of motivation of the members of the online community to orientate their activities not only within the online community, but also to achieve a higher level of Collective Intelligence with a view to responding to the needs of society and involving transfer of urgent problems to the life of online communities. It is a stock which represents the outer world of an online community and relates it to the outside, thus making its activities meaningful.

3. **Collective knowledge.** Collective knowledge, as an element of the model, is the axis of the whole model, which contents depend on all the other elements of the model. During every cycle, a new portion of collective knowledge complements the existing knowledge, thus maintaining the motivation of community members to stay in the community and meeting individual objectives and aspirations of the members in solving their problems.

Causal loops of the conceptual model and their sustainability. The conceptual model is based on three positive and unlimited reinforcing feedback loops and one balancing loop stabilizing unlimited growth.

- *R1 feedback loop – the emergence of collective knowledge.* The R1 cycle is made up of the following variables: trust, a new idea and the incubation of the idea, collective knowledge and transfer. In this cycle, collective knowledge has the meaning of a stock.

A feedback loop of the emergence of collective knowledge is a strengthening link which is formed when the members of the online community, trusting one another, begin to share thoughts, ideas, problems or any other issues; later, having given sufficient time for the incubation of ideas, they create knowledge of new quality which emerges only during the interaction with their peers. The loop is closed when collective knowledge becomes actualized through its use, sharing or transfer. If one of the links in this communication does not occur or occurs at a less considerable extent, it directly affects the extent of collective knowledge, which diminishes the possibilities of dissemination.

– *R2 feedback loop – formation and maintenance of social ties*. R2 feedback loop is made up of trust, interaction and a short distance between the members.

The essence of the second R2 cycle is to explain what long-term consequences constant interaction has and how it emerges. Initial trust, sometimes brought form the outside, creates an impetus to build routine cooperative relationships through periodic communication. Such ties create dense networks which members are linked by the shortest possible connections. Short distances between the members of the network build greater trust which itself encourages the members of the online community to share most unexpected ideas.

– *R3 feedback loop – ecosystem of the online community*. The R3 feedback loop is made up of social acceptability, a new user, diversification of a community group, the number of the members of the online community and trust.

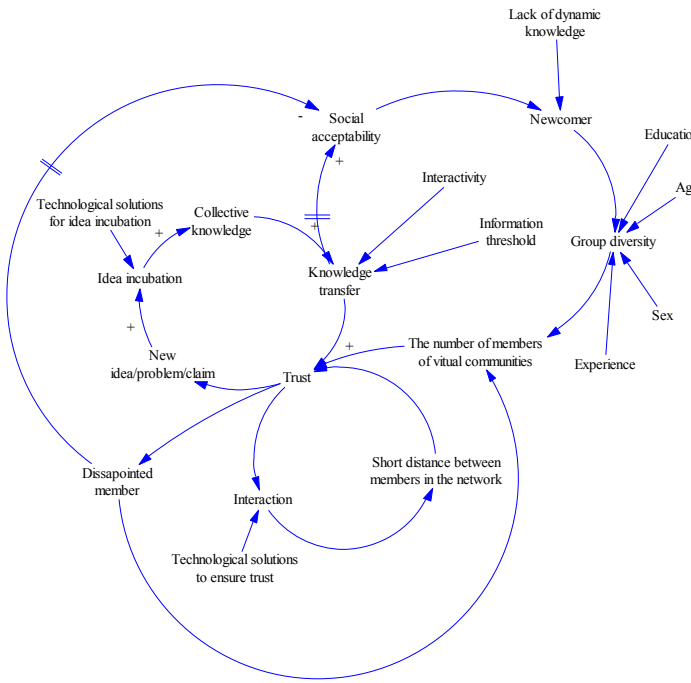


Figure 55. Causal loop diagram of the emergence of Collective Intelligence in online communities

One more positive strengthening feedback loop, linking the online community to the outside world, is formed outside the online community. When there is a certain level of collective knowledge which is related to the transfer of this knowledge, this knowledge has an impact on society, even though with some delay. However, this delay could be considerably long and not felt for a short period of time, but this positive impetus undoubtedly affects the public in such a way that it stimulates some people to join the online community. A new user expresses his wish to join the community if he feels the shortage of knowledge and has some prior information that a particular online community can be trusted and could fill in this gap. A new member brings innovative ideas to the community together with his otherness in relation to other members of the community and, thus, he insures the required diversification of Collective Intelligence which depends on demographical properties (gender, age, education and work experience). Thus, owing to this link, the online community acquires a new member. Social networking research shows that in online communities new members have the central position in the network (Nguyen, 2011) and their distance with other members of the community are the shortest. It determines greater interaction between the new members and simultaneously insures the maintenance of stable ties between old members. This feedback is responsible for a healthy ecosystem when there is the redistribution of knowledge flow between the members of the community and the external world.

These three positive strengthening ties create a continuous and uninterrupted process, which, ideally, create Collective Intelligence of an increasing value. However, a reverse and competing process is being formed.

– *B1 feedback loop – evaluation of dissemination and trust.* B1 feedback loop is made up of the following variables: trust, disappointed member of the online community, number of the members of the online community.

After the R1 feedback loop occurred, the result of the dissemination of knowledge may be unsatisfactory and the level of trust between the members may be inappropriate for a member of the community. This determines withdrawal from the community. This loop is balancing as its operation determines the decrease of the number of the members of the community. The position of a dis-satisfied member is reflected in the

value of social acceptance significantly faster than positive dissemination of knowledge; however, this position affects the satisfaction of the public with delay. Thus, a dis-satisfied member, having left the community, much faster transfers the evaluation of the online community than the dissemination of collective knowledge.

Boundary conditions of the Model. The suggested Model explains both forum-type online communities (a member joins them being guided by a short-term interest, having satisfied it, he does not associate himself with the online community) and other online communities of like-minded people who associate themselves with the community in order to achieve long-term goals.

Discussion forums are such forums in which members search for specific information and actively participate in discussions presenting their views. Having solved their problems, they may be no longer interested in the processes of the online community. Often, such a forum member may not even use the mechanisms suggested by the interaction. He may go through R1 feedback loop processes and after one (or several) successful cycle of the generation of collective knowledge, having resulted in the dissemination stage, he may leave the online community with greater trust in such communities and their activities, thus enhancing social acceptability in society (B1). In this case, additional interaction, membership in the network and the prerequisites for the formation of greater trust become secondary if the level of collective knowledge corresponds to the level of the search of a new user.

Online communities of the like-minded people (an example of professional communities). The strength of online communities is encoded in the maintenance of trust which is formed during constant interaction, seeking to shorten average distances to every member of the community or in every network of leaders (R2). Then, with the emergence of trust, an unexpected cycle of the generation of ideas and collective knowledge is formed as if by itself (R1). The viability of these feedback loops lays the grounds for generating ties of new members (R3).

Conclusions. Internal processes of online communities and their evolution can be described in detail only by combining several scientific paradigms. Thus, the interaction of social networks and social interaction, knowledge management and Collective Intelligence enabled detailing the most significant factors of success of online communities, having

linked them into the conceptual model of online communities based on Collective Intelligence. The conceptual model, grounded on system dynamics modelling technique, reveals management rules enabling dynamic prediction of the trends of the evolution of online communities or the acceleration of strategic changes. The conceptual model has revealed the relations between collective knowledge and the number of the members of the online community. It is trust in the members of the community. The initial level of trust may be determined by the level of collective knowledge but later its dynamic transformation depends on the mechanisms of the insurance of interaction, among them on technological solutions. In the conceptual model, the size of the online community is not stable; its concrete value depends on joining and leaving members of the online community. A positive balance of the members manifests satisfaction with the activities of the online community; it also means the emergence of Collective Intelligence. This value of the stock also depends on the dissemination of collective knowledge and skills which make the consumer nature of collective knowledge meaningful. The conceptual model enabled links between the internal processes of the online community and the external ecosystem which, on the one hand, encourages the changes of the external world for the sake of Collective Intelligence of the online community and, on the other hand, motivates the online community to act within the framework of the external rationalism.

CONCLUSIONS, INSIGHTS AND RECOMMENDATIONS

1. Seven exemplary initiatives are employed to achieve the goals of Europe 2020 Strategy; the first initiative (EU Digital Agenda, which aims to aid businesses and society to achieve the maximum value through development of technologies) and the second initiative (Innovation Union, which seeks encouraging a wider smart specialisation in the fields of research and innovations and enhancing the efficiency of cooperation between public and private sectors) are the most important for the development of Collective Intelligence and the sense of community. It should be noted that the word "smart" is used in the context of Europe 2020 Strategy to refer to smart investments into education, research and innovations; meanwhile, in the context of Lithuania 2030 Strategy, it is used to refer to three dimensions (society, economy, public governance).

2. The fundamental initiatives of Lithuania's Progress Strategy "Lithuania 2030" (Lietuva2030.lt, 2014) seek to make the society more active and achieve participation of every inhabitant of Lithuania in the substantial changes. The part of Lithuania 2030 Strategy that describes a smart society is aimed at creating a culture based on the sense of community and trust, it points to the need to reconsider national identity, to find the links that unify society and enhance the power of citizens. The Lithuanian model of a democratic society is characterised by the instruments of direct democracy and citizen initiative that have been rather well developed over the short period of independence but they are not used to their fullest due to the lack of citizen activity, political competence and habits of expressing their will and opinion as well as the common attitude that citizens cannot influence the decisions adopted by the government. However, even the old European countries are also experiencing the crisis of representative democracy due to the philosophy of individualism, globalization and Europeanization. Here, the re-creation of the links between the government and society and the development of the linking capacity become a critical factor that is possible owing to the implementation of public innovations and encouragement of policy networks among interested groups and governmental institutions

(Bekkers et al., 2011). Lithuania's major problem (low civil activity and overall societal disillusionment) can be solved by social technologies. The general level of the country's technologisation is relatively high as regards the infrastructure of information technologies, existing solutions and user accessibility. The number of inhabitants is small. If we consider every inhabitant of Lithuania a potential "client", this would correspond to a 3-million-user market and this is a solvable task even for a young Silicon Valley technological enterprise launched by 3-5 persons.

3. The application of social technologies for societal problem-solving is one of the most progressive ways to broaden the identity, EU integration and EU supra-nationalisation research field. In network-type societies, which specific feature is the impossibility of defining one clear power centre, the need for understanding structural characteristics is especially important. Since a structural unit "cannot" interact with the structural "centre" (it does not exist) in network-type structures, it has to interact with the whole entirety of the network structure (rules, norms). Due to this reason in particular, "collective identity" becomes a guarantee of the stability and self-discipline of the network and network units (nodes). So, in this sense, a unit's identity can be directly related with the potential of strengthening the state's power and competitiveness in the system. In this sense, identity acquires an active (managerial – how I am supposed to behave) function, not a passive (philosophical – what I am) expression in the network society. Since identity is not only an inter-subjective, but also a (re)constructed phenomenon, the possibilities of correcting, controlling a form of societal identity should be treated as proactive (preventive) strategies adopted by authorities in order to solve societal problems and problems related to the management of a society. Because of the network society's specificity, which impedes the use the levers of traditional power, social technologies should be regarded as some of the most important tools for organising network power and network society, which guarantee a fluent and progressive structural growth, societal socialisation and preventive protection. To achieve this aim, both the hard and soft social technologies can be employed, which are capable of acting, controlling, classifying, diagnosing and, thus, directing the multitudes of social identities towards a preferred direction.

4. After having overviewed the evolution of community-based and non-governmental non-profit organisations in Lithuania, it can be claimed

that both factors – national (legal basis for establishment of organisations, citizens" desire to deal with both the local community and the general public issues) and external/international (to mention foreign aid to the third sector) – have had an impact on the growth of organisations in number. Lithuanian civil society is yet in the process of creation; therefore, the role of public administrations seeking to create the most favourable conditions for the "third" sector development is one of the key importance. Taking into consideration the management trends of the investigated community-based and non-governmental organisations, the following assumptions about management perspectives can be made: 1) in the context of globalisation, the need for development of communication and cooperation competences will grow along with the increasing mutual cooperation between community-based and non-governmental organisations; 2) innovative human resource management methods, corresponding to the changing trends of organisational environment and members" competences, will expand; 3) the need for digital content technological tools for organisation management will also increase. The management trends, identified by the study, make up the premises for the government, which aims at developing the "third" sector and fostering citizenship, to recommend more targeted activity and greater attention to enhancement of community-based and non-governmental, non-profit organisations" competences in relation to (i) communication through digital technologies, (ii) strategic and (iii) human resource management. To enhance the civil society based on non-governmental organisations, more active involvement of the public authority administrations is recommended. This would create minimum existence conditions for the organisations, allowing not taking part in project implementation (contracted services from outside).

5. Social technologies is an interdisciplinary research field, which focuses on applying information, communication and emerging technologies to serve the goals of society. The term "social technology" is defined as a set of potentially arbitrary effective social challenges refillable solution, ways to achieve the intended results, doing social impact on human, social groups, different behaviour of social structures. In this monograph, social technologies, as a general term, are defined as digital technologies used by people to interact socially by creating, enhancing and exchanging content together. Social technologies should be perceived as tools to unify the wealth of interests and intentions of the units of a

social structure in order to use the internal features of a social community as efficiently as possible. Thus, social technologies can be seen as an intervention means to affect the social elements of societal structures. A clear declaration of the aim, the achievement of which can be facilitated by such intervention, is the major criterion enabling to call the technology, which in one way or another affects social processes, a social technology. Technological advancements broaden the possibilities for "technologizing" the management and organisation of complex societal structures rejecting the hierarchical model. Social networks, means of public debates, social publicising, virus marketing, social marketing, systems of artificial intelligence, virtual worlds (e.g., *Second Life*), legislation informatics and other technologies which are capable of forming an online community and Collective Intelligence can be used as a political and administrative technique, a technique that can become an important part in optimising the management of a multicultural network society.

6. Each attempt to systematize knowledge and conceptualize pheno_ menon leads to a promising future of Collective Intelligence purposeful application and effective employment in society life. In this monograph, Collective Intelligence is defined as the general ability of the group acting collectively to perform a wide variety of tasks. Any situation "where large enough groups of people gather, act individually but also share some common community goals could potentially be – through the proper use of technology – transformed into a Collective Intelligence system. Collective Intelligence systems vary significantly in nature, from collaborative systems e.g., open source software development communities, and to competitive systems, e.g., problem-solving companies that benefit from the competition among participating user teams to identify solutions to various R&D problems" (Lykourentzou et al., 2011). The concept of Collective Intelligence is closely related with many other existing conceptualizations, i.e., open innovation (Chesbrough, 2003); crowdsourcing (Howe, 2008); wisdom of crowds (Surowiecki, 2004); wikinomics and mass collaboration (Tapscott and Williams, 2006); and service-dominant logic (Vargo et al., 2008). Exploitation of online media potential to leverage connectivity, responsiveness, creativity and innovation and co-creation of value with stakeholders is common for these paradigms (Wise, 2014). At present, there is no theoretical framework capable of explaining how Collective Intelligence actually works. Therefore, it is challenging for researchers from

different research fields to learn about advancements in other fields, possibly under differently named concepts.

7. Analysis of legal preconditions for CI identified five main public inclusion forms, which are the following: petition, consulting, legislation imitative, referendum and elections. Petition and initiative of legislation are two out of five forms, where CI is evident at the initial stage and in the development stage. Moreover, ways of implementation are possible only in group, i.e., again, manifestation of CI is visible. Presentation of a document (a petition or draft bill), a group of initiators basically stops leading its further improvement or adjustment process. In the case of counselling, the situation is different because here, as a result, further analysis of suggestions and their improvement can be seen and provided, thereby creating Collective Intelligence. Counselling is often a continuous process that takes place until the document is finally compatible and submitted to the competent authorities for consideration. The right of initiation of the referendum is analogous to the right of the petition or legislative initiative, where Collective Intelligence manifests at the initiation stage. Elections differ from these five forms as their periodicity is clearly set in the Constitution and their significance is generally accepted. In both cases, the referendum and elections, the formation of Collective Intelligence are very important in the initial idea generation stage. Although every participant adopts the final decision of the referendum or election individually, the referendum or election results can be interpreted as an expression of Collective Intelligence.

8. Scientific analysis of theoretical sources has shown that the main risks associated with Collective Intelligence building are loss of control over the project, possibilities to abuse the process, too high level of diversity of participants, motivation of participants, privacy, false identity, intellectual property issues and censorship. These aforementioned risks can be described as a system, as each of them has a close relationship with the others. Risk of loss of project control is closely related to legal threats, such as privacy violations or false identity, as the lack of control at management level can often create space for data leakage and abuse. Moreover, the loss of control is related to censorship. When the managers understand that they do not control virtual network activity, they can make efforts to censor it. In addition, it should be noted that participants of online communities may abuse freedoms by violating laws and the

rights of other members of an online community. Such offences may be associated with their privacy rights, intellectual property rights or other factors. Too high level of diversity of participants creates an opportunity for involvement of people who do not have enough knowledge, competence or experience to deal with certain issues. If incompetent participants start dominating, experts respectively will lose their motivation to act in such a community and such situation increases the risks of false motivation and management. Without motivation and its support, people tend to lose interest in the community and it is difficult to attain common goals. Participants" motivation also decreases if people experience threat, for example, a threat to their intellectual property rights or personal data. From the legal point of view, it is necessary to find a balance between the following: between privacy and the requirement to disclose the identity; between the positive results of using high standards for intellectual property protection and CI effect as a more advanced form of problem-solving; between the need to control virtual communication content (seeking to prevent human rights violations) and online community members" right to self-expression, the right to share views and ideas freely. It is concluded that a huge role is assigned to the management and legal risks in the process of people's involvement in virtual activity. At first sight or in the first interactions, this effect is sometimes not noticed, but later the participants often begin to assess the threats they face in social networks. The main risks and indicators measuring them can help developers of platforms to attract people to safely participate in certain activities and foster long-term cooperation. CI generates new knowledge quality and, hence, managing its emergence and development is an important and complex task, requiring a lot of scientific expertise.

9. A unique research methodology was created for the conducted research, which helped to assess the Collective Intelligence phenomenon empirically. The research methodology is characterized by a variety of methods, which was determined by the complexity of the research problem and formed by project team members" competence. The strength of the research methodology is that CI phenomenon has been studied in terms of the different fields of science to bring together different perspectives to the system dynamic model of Collective Intelligence as well as to create Collective Intelligence monitoring methodology based on the CI Potential index calculation. After having assessed and integrated various approaches

to CI, the main criteria for the emergence of CI have been identified at the theoretical level and the hypotheses about individual factors influencing the emergence of CI formulated. Hypotheses were tested quantitatively and analysed during qualitative research and experiment. Network structures of society (online community projects) were selected as the research object, which used the collective cooperation and decision-making tools and technological solutions that promote personal and community creativity, entrepreneurship allowing the emergence of new forms of self-organisation and self-governance. The conducted study treated indirect collaboration platforms, such as systems of Collective Intelligence. CI systems may differ in terms of users or purpose, but they all seem to share a number of common characteristics, e.g., they all require participation of an adequate number of users who act individually, but share similar goals as a community.

10. Collective Intelligence system can be conceptualized as a knowledge network created by web-mediated (social technologies) interaction amongst individuals with personal knowledge. The development of the knowledge network is essentially based on the creation, transmission and fusion of knowledge within the community. Collective Intelligence systems are composed of people and information communication technologies. Human intelligence in convergence with "machine" intelligence creates opportunities for network participants to achieve impressive activity results. Although online communities are often criticized for the lack of direct contact, yet, in comparison with traditional communities, the networked ones can operate more efficiently due to technologies that make it possible not only exchange of large amounts of information, but also help process information more efficiently. It can be stated that CI emergence in the system confirms the idea that a community exhibits higher intellectual abilities than an individual member. New knowledge, new ideas, found solutions, suggested problem-solving methods, shaped up public opinion, structured opinions and views, developed innovations, prototypes, generated added value, etc. are considered to be intellectual capacities of the community.

11. The variety of Collective Intelligence systems is extensive in the international context. They offer great ideas, possibilities, technological solutions and business models. Growing potential is associated with the CI platforms offering tools and resources for decision-making and problem-

solving as business knowledge, social ideation, intelligent crowdsourcing, idea contests and virtual marketplaces. Social collaboration and life-long learning/organisational learning are another two areas where traditionally performed activities could be transformed into a completely new quality of civic engagement applications, individual as well as organisational learning and development. There is a great variety of idea generation methods: from information exchange, discussion, online and offline workshops and meetings, communities of practice interaction to brainstorming, voting, game, contest or market generated knowledge. Depending on the platform, but the strategic decision-making by the majority of platforms is usually assigned to the platform community in cases of idea generation and assigned to the platform "owners"/administrating teams/advisor committees/or a board of Trustees and similar in cases of when decision to act is required. Group size/critical mass, as the diversity of participants or the groups, is essential for all platforms to reap the full potential of the benefits that one or another platform is up to and where there are many tools and strategies used by them to encourage this. In terms of self-regulation, the majority of platforms usually apply structural decision-making, leadership, conflict management procedures to some extent, but the approach is rather drifting towards the community's self-organisation than the hierarchical structure.

12. The evaluation of international collaboration platforms indicated that motivation, technological solution and the overall business model are the key factors for stimulating the viability and sustainability of the Collective Intelligence systems. In terms of motivation, social as well as intellectual motivation prevails in many cases, but financial remuneration is very common in the platforms contributing towards decision-making and problem-solving. Technological solutions are also very important, as sometimes they become the most important factors for attacking and retaining platform users and contributors. Each platform has a package of main and unique technological tools to satisfy their specific needs, which are then combined with more widely used relevant technological functionalities. There is a great variety of the overall business models of the platforms. Each platform tends to use its unique advantages to generate financial income.

13. Quantitative research results indicate that the use of the Internet among Lithuanian residents is frequent. 44% of the research participants

search the Internet on a daily basis. The Internet is used for work-related communication, general knowledge and news, carrying out personal financial operations, personal communication, entertainment and gaining specific knowledge/for the learning process, less frequently the Internet is used to express one's opinion or share knowledge as well as for professional communication or personal needs. 61% of the Internet users make use of pages of online communities or social networks. Therefore, the Lithuanian society's overall potential for the emergence of Collective Intelligence is much weaker than the residents" possibilities to participate in the activities of distant communication. It can be concluded that despite a high accessibility of the Web in Lithuania, people are not inclined to join socially-oriented activities. This obvious finding indicates that accessibility is a condition, but not a catalyst for increasing social involvement of society.

14. The use of the web pages of online communities or social networks and participation in their activities (one not only reads, is interested in, collects information, but also writes, comments, shares experience) are connected with the area of personal interest, hobbies and studies/learning. Social networking is used to maintain contacts with acquaintances and find information on issues of one's interest for entertainment and search for information about goods and services. However, the Internet users take the opportunity rather passively for the idea contribution, for supporting ideas, joining initiatives or projects, initiated by other people. The Internet pages oriented towards solving social problems are used by 7% of all Internet users (5% of the population).

15. Educational, social as well as ecological, environmental and climate change-related issues are the most topical for the users of the Internet pages (the hypothesis H8. CI system has the potential for CI emergence when it demonstrates adaptivity to socio-cultural context was confirmed). However, such reasons of using the Internet highlight respondents" passive participation rather than an active wish to contribute to the creation of intellectual values. The most valued aspects of the Internet use include the possibility to find the like-minded, expand one's outlook, get to know more, get the information of one's interest, have an opportunity to express one's opinion, propose new ideas and initiatives, as well as get more objective information about different political or social issues (the hypotheses H1, H2 and H3 were confirmed). The top five best valued aspects are underlined by 20-29 year-old Internet users, students,

pupils, single men and single women and by those who use the Internet pages of online communities and social networks.

16. What concerns participants of Collective Intelligence emergence, it is important to mention that the daily ("strong") visitors of the pages of online communities and/or social networks can be called "young enthusiasts" (most of them are under 39, have higher education, are students, pupils, single men and single women, families of three or four members, having a child, the research participants whose income per person per month exceeds 1000 Litas (290 EUR) on average or the respondents who have not specified their income, and residents from the 3 major cities) and they account for the biggest part of visitors of these Internet pages (56%). The percentage of "medium" and "weak" Internet users, who are slightly older than the young enthusiasts, is very similar, i.e., 24% and 20%, respectively. "Strong" visitors of the Internet pages of online communities/social networks use the Internet more frequently in general and use it more often for almost all purposes, as well as are more frequently satisfied with most aspects of virtual communication (the hypotheses H7 and H9 were confirmed). A community has a greater potential for CI emergence when appropriate mechanisms to motivate the users are created and there is a balance between community participants" goals and the community goals. Both those who use the Internet pages for discussing and solving social problems and those who do not use them report similarly that while communicating virtually, there is a lack of respect, communication culture, competence and participants" experience. Participants choose such platforms that possess transparent and flexible organisational structure.

17. Virtual networks may serve as a useful tool, which encourages deeper involvement into socially-oriented activities and it may even be treated as a new form of civil engagement, which grants more effectiveness and compliance with society needs. Moreover, it is a more acceptable tool for involvement of citizens into decision-making processes because it is more confirming the everyday life style of people in the contemporary world. On the other hand, social technologies create an illusion of safe and simple communication, thus, in reality these rapidly developing tools also create a new area for crimes so the people, who engage themselves into any Internet-based activities, should be aware of the risks, which may exist (H6). Security is one of the most significant needs of the members of virtual communication networks. The majority of the Internet users

agree that strict responsibility has to be foreseen against members of online community if they violate other persons" rights and that the administrators of these pages have to take responsibility for the contents spread via them. As for the reasons that keep away non-users from using virtual tools, the results indicate that the respondents are mostly worried about the threats for their personal data and intellectual property as well as about violations of rights and obligations. Yet, the respondents stated the importance of State control over content of the Internet, the lack of attention toward intellectual property in online communities as well as the fact that neither people feel safe in virtual space, nor they think their data is secured. These responses clearly lead to the idea that attention must be paid towards cyber security issues in order to develop safe and reliable environment for people, who wish to engage and generate ideas for greater welfare of society. From the cyber security perspective, the respondents do not rank the legal risks as critically important, but they are aware of cyber security issues and strongly support most offered ideas about safe and secure operations online. It shows that people in Lithuania still lack experience in online activities and cannot identify independently what problems they might face in virtual space. The united effort is necessary – from the government and law enforcement to the general public – to meet the evolving challenges in securing cyberspace.

18. The aim of the qualitative research was to deepen and broaden knowledge about initiation and implementation processes of online community projects as well as to reveal the conditions of Collective Intelligence emergence resulting from the activities of these communities. The research focused on analysis of the case studies of active online communities in Lithuania. It is relevant to mention that qualitative content analysis is not an appropriate method for confirmation or rejection of hypotheses. Therefore, they were analysed in the context of the respondents" provided ideas, arguments and opinions pursuing to deepen researchers" understanding of the concerning issues. Although the questionnaires were constructed according to the theoretical insights gained from analysis of literature, not all dimensions were reflected in the research data. As a result, nine categories reflecting Collective Intelligence potential were identified: motivation of group/participants, group/participant diversity, group/participant dynamics, impact of time and location, methods of idea generation, group size/critical mass, anonymity/publicity decisions, strategic decision-making and self-organisation.

19. The research results identified the key aspects of group work efficiency: virtual accessibility, non-virtual relationship, anonymity, team management. The characteristics of virtual accessibility identified during the research are related with the so called technology-based social communication allowing implementing a big variety of activities and solve different tasks, also involvement of participants living in different countries and operating in different environments. Noteworthy is the finding that although the survey participants mentioned the virtual accessibility feature of online projects as one of the most important teamwork aspect, part of them emphasised the importance of parallel non-virtual communication. Team management, according to the respondents, is a necessity while seeking to control compliance of certain principles in a particular online community, for example, transparency, ethics, etc. Analysis of research data allows perceiving a trend of earlier online project participants" influence on the newcomers" opinion, as well as the inclination to individualised and isolated participation. The emergence of such trends should be evaluated negatively, as any social influence can reduce the quality of collective decision.

20. Qualitative data indicate that open, dynamic and flexible systems empower groups of people solve problems which are difficult to deal with for single individuals or organisations. Time and location solutions in online community projects contribute to solving cost reduction problem. However, it is worth mentioning that some participants emphasize free time after work and express the opinion that participation in the project is a leisure time activity, whereas other respondents treat participation in the project activities as work. The conclusion can be drawn that virtual activities can cause additional psychological problems to participants due to their advantages, such as openness, flexibility, accessibility. Platform developers should consider simplicity and user-friendliness of technological solutions.

21. To summarize the qualitative research participants" opinions about activities in online community, it is claimed that new solutions, search for ideas and collectively generated problem solutions (*H2*) are not common objectives in the online community projects under the analysis. More often, exchange of information and aggregation of knowledge are mentioned. Therefore, most of the surveyed projects could be described as the ones of social communication and search for incremental practical changes. Insufficiently smart technological solutions and a moderate

number of participants could have an impact on that, not guaranteeing critical mass effect. Analysing the data on the projects, which seek to exchange and gather information, different methods were identified, such as simple exchange of information and opinions, discussion. Also, non-virtual methods are mentioned, such as workshops, meetings, etc. On average, half of the surveyed projects had implemented collective brainstorming, collective problem-solving and conclusion making technological solutions. Yet, just a few communities apply mechanisms of voting and ranking. Neither gamification, nor contest or collaborative market principles were identified in the knowledge generation process. In that respect, there are a lot of opportunities for application of social technologies to promote creative processes.

22. Analysis of the interview data revealed that the researched online communities choose different solutions of participants" anonymity and publicity (*H3, H6*). This is predetermined by the twofold role of virtual anonymity – independence from external influences conditions creativity and at the same time reduces possibilities for the group control. The number of online projects set up for public goals is increasing in Lithuania and this indicates growing citizens" willingness to develop public debates on relevant issues and look for innovative solutions. Nevertheless, the qualitative research revealed one major advantage of the virtual environment – anonymous participation – which is not fully exploited, as in most of the platforms such participation is impossible. Analysis of the qualitative research data allowed distinguishing three groups of solutions, important for transparent and effective self-organisation (*H4*): structure solutions, leadership solutions and conflict management. The group of structure solutions covers responses about established and dominating hierarchy and relationship and distinguishes horizontal and vertical hierarchical structure projects and their elements. Analysis of data on the leadership aspect in online community projects highlights the importance of formalisation level and clear structure of leadership. The division between the generation of problem solution and decision to implement the solution was also identified. Solution generation activities related to involvement and participation of the group is a noticeable trend. Meanwhile, the final decision to act and solution activities are carried out by a responsible person or a group. It is claimed that most of the platforms can be related to objectives of a group of interested initiators

to use public support in solving important questions. Therefore, the right of decision-making is held in the hands of initiators. Such trend can be treated as having a negative effect on the quality of Collective Intelligence, as Collective Intelligence is directed towards collective, not individual, decision-making. During the qualitative research analysis, three types of online community participants" motivation were distinguished (*H9*): material, intellectual and social. Most often, the research participants discussed about the most relevant cases of social motivation in online platforms, by distinguishing importance of opportunities for social communication, group communication, social evaluation and self-realisation. The qualitative analysis allows concluding that participants" motivation issues are solved ineffectively in many online communities, leading to an inappropriate number of competent participants, capable of contributing to creation of high quality collective products.

23. Summarising the impact of social technologies on creation of Collective Intelligence potential, it should be emphasized that, firstly, online communities have to be designed to pursue a particular objective and the design should explicitly represent the pursuit of this objective. Privacy and personal data security support in creating a potentially active community and encourage a variety of opinions. Therefore, users' security measures must be built in, as well as in some cases anonymity ensuring technologies. The central axis within the Collective Intelligence systems is information and data, thus, applications should be designed in such a way which would create opportunities for knowledge gathering and distributed memory. As collaborative platform users create the added value, certain mechanisms with options of modifying, augmenting and any other ways of content constructing are needed. Knowledge or aggregated information constructed in the platform could be assessed outside the system; therefore, mechanisms of collaboration with the outside and distributed memory should be ensured along with possibilities for the re-use of data. Modern applications should be adapted to all kinds of e-gadgets, not to mention computers, by integrating Internet servers and suggesting integrated service for all kinds of devices. "The perpetual beta" service should be installed as a norm and the application should be constantly updated according to users' needs. Gamification can be utilised as one of the ways of individual and collective creativity encouragement to involve younger generation into community's virtual activities. By using gamification for

development of creativity, motivation for creativity and the knowledge base building, as one of the most important method of productive action, could be encouraged. The adoption of game level for non-game contexts also requires easier forms of involvement comparing to playing games for entertainment. The question how to apply the elements of game mechanics according to personal features of individuals having few parallels with game culture is yet topical at both individual and collective creativity level and in the context of other fields.

24. Dimension of social technologies in online communities was assessed by six integrated indicators of scientific experiment: external and internal networking/collaboration technologies, safety and privacy, decision-making support, knowledge creation and knowledge sharing technologies, media/design quality, data aggregation and assessment technologies. It has been noticed that technological options for chats and discussions in most communities homepages are underdeveloped, more often participants are directed to register on social networks and use opportunities provided by these networks. According to security and privacy technological level, the communities divided almost evenly: almost half of them have installed these technological tools. Technological level of knowledge aggregation and sharing among the researched communities can be seen above the average generally. Most developed are technologies of knowledge visualization and organization, formation of interest groups, possibilities of contributing to the value of knowledge. However, it should be noted that the technological level was analysed in the context of the researched communities. However, if this level were researched in terms of technological solutions level of foreign online communities, just one or another community could be positively assessed. In terms of media and design quality, the researched communities were generally regarded as average, and only a few of them could be recognized as possessing user-friendly, comfortable environment. Contest or "gamification" elements in most communities are not available either. Implementation of additional technological capabilities would enable to involve larger groups of people in decision-making processes and encourage wider participation of citizens in self-governance.

25. In this research study, an effort has been made to identify the common characteristics shared by CI systems, in order to develop a general CI Monitoring Technique. The modelling approach is based on CI system

functionality and identifies the basic issues related to the CI emergence. The CI Potential Index is expected to facilitate IT developers, policy makers,.business designers and user communities to recognize whether a system has the potential of becoming a CI system, to maximize the benefit that the community and individual users will receive from the system and decide on the proper technological means. The Potential for Collective Intelligence Index (CIPI) is a relational conception that defines capacity of online community for aggregating and creating knowledge, creativity and decision-making, ability for self-organising, adaptivity and emergence of "swarm effect". CI Potential Index has been designed around three indices, which are defined by different dimensions: capacity level (macro level), related to diversity, independence and knowledge aggregation by interactions of massive participants ("wisdom of crowds effect"); emergence level (emergence level), related to the system state of Collective Intelligence. The Collective Intelligence systems are characterized by self-organization, and adaptivity and emergence of synergy and social maturity level (micro level), based on the community and individual objectives, etc. Although many authors highlight the importance of such factors as societal influence, social orientation and motivation, involvement and participation in social activities, reputation index, etc., in the process of "growing" community's intellectual potential, due to the limitations of this research study in scope and duration, the hypotheses in relation to social maturity impact on CI development were not constructed. Insights about the relevance of these factors were presented at the theoretical level and could be researched empirically in the future.

26. The conceptual CI model, which was based on system dynamics modelling technique, reveals management rules which enable foreseeing the trends of the development of the online community or encouraging its strategic changes. The system dynamics model enabled relating internal processes of the online community with the external ecosystem which, on the one hand, encourages the changes of the outer world because of the emergence of Collective Intelligence in the online community; on the other hand, it motivates the online community to act within the framework of external rationalism. The conceptual model revealed the link between collective knowledge and the number of the members of the online community. The growing number of the community is related to trust shared between members. The initial level of trust can be preconditioned

by the level of collective knowledge. However, later its dynamic change depends on the interaction enabling mechanisms, among them – on technological solutions.

27. The application of Collective Intelligence Potential Index methodology during the experiment evidenced a huge variety of problems being solved in the platforms. This caused difficulties in community assessment and comparison. Data mining and web scraping techniques could be suggested for comparative analysis of more homogenous communities in the future. These would improve the quality and reliability of such analysis, with small communities in particular, which use an individual domain for their activities. The criterion of problem diversity together with the problem of "quality" assessment is one of the key importance. Therefore, it should be given a bigger focus in the future research. While assessing "critical mass" attraction ("swarm effect") criterion, it is important to decide whether "swarm effect" existence is really necessary for an organisation or community for their mission and vision implementation (more is not always better). A big number of participants can imply additional challenges of activity control and management: individual participants seek to analyse different problems; therefore, control of information flows becomes complex. Complexity of online community projects impedes information search, processing big amounts of information and identification of major problems that need to be addressed. Due to this reason, it is necessary to find a way to prevent from unnecessary or excessive information, manage discussions and reach a consent in large groups.

28. Analysis of problem-solving efficiency evidences rather low maturity of nearly all communities in general. Exchange of information is dominating with some exceptions. This correlates well with the general level of public passivity, which was confirmed by other research (e.g., Lithuanian Civic Society Empowerment Index). It was noticed that those communities, which seek to analyse problems, give feedback, general and objective conclusions, also better meet other evaluation criteria (technological preparedness, analysis of alternatives, variety of ways of expressing opinion, procedures guaranteeing equal opportunities to express oneself, issues of privacy and anonymity). Therefore, a bigger focus should be given on the comprehensiveness level of alternative analysis, measuring and in-depth analysis of the problems. When measuring self-organisation potential, it was noticed that technological preparedness in many cases is

better than procedural readiness (*H4, H10*), i.e., technical possibilities are created but not explained procedurally how to use them and what final outcome they could lead to, low level of description of common standards, procedures and activity. While analysing this criterion, a big gap between different communities was observed; therefore, in the future research it is recommended to divide communities at least into mature and developing ones. Evaluation of common standards, procedures, values, etc. should be given bigger significance in developing communities, whereas mature ones should be assessed additionally according to leadership, balance, technological and procedural openness factors. It can be concluded that CI formation in online communities is at its initial stage, thus, to discuss particular results is too early. Yet, the development of civic engagement can also be seen as collective consciousness and a form of Collective Intelligence, respectively. Communities in pursuance of their vision and mission implementation solve problems and perform activities, adaptively reacting to the essential problems. Most of them actively learn and exchange information by carrying out activities, thus creating preconditions for Collective Intelligence development in Lithuania.

29. The first conducted research reveals bigger involvement of young persons in virtual collective collaboration systems, as well as in bigger civic empowerment. Therefore, this research creates preconditions for a breakthrough in the formation of civic empowerment by using "digital generation" participation in online communities. Besides, all these research studies are related to common decision-making process, what Bonabeau (2009) named "Solutions 2.0" in business context. This means that knowledge acquired by scholars, developed models, recommendations can be easily transformed into other areas, in which a) solutions are needed, b) people participate and c) there is a need to speed up decision-making processes by using technologies or solving the problem of complexity. The long term vision of CI systems is to fuse the knowledge, experience and expertise residing in the minds of individuals, in order to elevate, through machine facilitation, the optimal information and decisions that will lead to the benefit of the whole community (Kapetanios, 2008). The project results could be multiplied in other sectors, where Lithuania has a high scientific potential and where the "second wave of social technologies" is forecasted (bio-, nanotechnologies, robotics, etc.). By creating new global products, innovative technology enterprises use social technologies for

creating a competitive advantage, but without scientific reasoning they often choose not adequate tools or methods and do not create the expected value and sustainability.

30. CI development field requires deeper research from the academic and practical point of view. It would be important not only to identify the assumptions affecting the development of CI, but also to predict possible development scenarios and to define risk areas. Nevertheless, taking into account the interdisciplinary nature of Collective Intelligence, future work could include combining the proposed methodology with the relevant findings of different research fields, such as computer science, social and cognitive sciences as well as biology. This combination is expected to broaden our understanding of CI and researchers could gain a more overall view on the subject. In the future, scientific research into Collective Intelligence could be compared to team, individual and Collective Intelligence efficiency when solving different problems, identify areas where the Collective Intelligence potential could be meaningfully used. Researchers should give support to the society to understand which modern society challenges are useful to solve collectively, not by grounding on opinions of individual experts. The relationship between Collective Intelligence and entrepreneurship could be an interesting research issue in the future. Participants of online platforms face practical problems, such as big "noise" of social media, lack of innovative ideas, security of innovations, etc. A problem of mismatch appears between demand and offer, as technical development is faster than changes of socio-cultural development. Members of society without digital skills are not fully exploiting technological capabilities. Researchers, such as Levine and Prietula (2014), doubt about benefits of collaboration. Their research findings show that people do not necessarily become better while collaborating; they face a risk of assimilation. They question the idea of "wisdom of crowds" by claiming that outstanding scholars often act individually. Although the virtual world raises a variety of scientific and practical issues to the society, it has to be admitted that cyber culture has opened collaboration opportunities, and their proper use is one of the challenges of smart society. Chapter 2 of this monograph justifies the use of Collective Intelligence potential in the networked society, which is huge: valuable to administration, management of business enterprises, innovations and the society as a whole. However, in the context of smart

society, the most important is the potential related to public opinion-based and harmonised with the society solutions, as this is the main axis of modern democracy. The major challenge for scholars is to understand how and where to invoke immense knowledge and experience of the networked society, one organizational network or virtually communicating community.

ANNEXES

ANNEX 1: Questionnaire for quantitative survey

1. How frequently do you use the internet? *Note to interviewer: the respondent can use the internet anywhere, not necessarily at home. E.g., at home, a library, an educational institution, at work, through a mobile device, etc.*

I do not use the internet (-> MOVE ON TO NEXT BLOCK OF QUESTIONS IN OMNIBUS)

Every day

Several times a week

Once a week

Several times a month

Once a month

Less frequently

Note to interviewer: Briefly present the theme of the survey, what the questions will be about and explain the terminology.

We will now ask you some questions about what people do online. Before proceeding to these questions, I would like to explain several key terms that will be referred to in this survey:

Definitions of the main terms used in the questionnaire:

A online community is a group of people united by common activity, experience, interests and problems who communicate with each other by electronic means in a virtual environment, e.g., by email, instant messaging, in forums or on social networks. For example, an online housing cooperative, virtual groups organising common activity (e.g., amateur fishermen, auto clubs, arts and crafts clubs, supermama.lt), etc.

An online civic initiative is the online formulation of proposals for solving social problems, with or without the aim of implementing the said proposals.

(For those who use the internet, Q1=1-6)

2. What do you use the internet for? *(Several answers possible. Change the order the statements are presented in.*)

For work-related communication (email, search, e-services, instant and video-messaging, etc.)

For personal communication (sending messages to friends and family members, social networking)

As a source for general information and news (online television or radio, news sites, online publications, social networks, RSS feeds, blogs)

For entertainment (games, social networks, surfing the web for no specific purpose, participating in online forums, downloading and watching films, listening to music, etc.)

For expressing my opinion or sharing information (writing comments on online news sites, civic forums; writing blogs, Wikipedia entries or entries in other online encyclopaedias, etc.)

For purchasing/selling products (e-shops, personal sales adds, mass shopping sites, etc.)

For finding specific information or learning something (e.g., how to fix a tap, how to bake a cake, various online courses)

For service-related personal communication (e.g., insurance, investment, ordering various services such as security, window installation, etc.)

For conducting personal financial operations (e.g., online banking, paying bills, topping up credit, wire transfers, etc.)

Other (*indicate*)_____

3. How often do you visit online community or social networking websites?

1. I am not registered to any such website and I do not visit these kinds of websites
2. I am registered to at least one such website, but I do not visit it
3. Every day
4. Several times a week
5. Once a week
6. Several times a month
7. Once a month
8. Less frequently than once a month

(Questions 4-6 for those who use online social networks, Q3 =1-6)

4. What types of online community or social networking websites do you use? *(Several answers possible)*

Housing cooperative and apartment block community groups, forums (for dealing with issues related to a residential building)

Kindergarten/school groups and forums

University/college-related groups and forums

Websites/forums for social communities and associations (e.g., for parents raising children with disability; individuals who have experienced loss or have common concerns or interests)

Websites/forums for business cooperatives and associations

Websites/forums for the activity of professional unions, associations

Groups/forums related to a field of personal interest or a hobby

Other areas you participate in (indicate)_____

5. Which types of online community or social networking websites are you an active participant in (i.e., where you do not only read and collect information, but also write, comment and share your experience with others)? *(Several answers possible.)*

I do not participate actively in any online community

Housing cooperative and apartment block community groups, forums (for dealing with issues related to a residential building)

Kindergarten/school groups and forums

University/college-related groups and forums

Websites/forums for social communities and associations (e.g., for parents raising children with disabilities; individuals who have experienced loss or have common concerns or interests)

Websites/forums for business cooperatives and associations

Websites/forums for the activity of professional unions, associations

Groups/forums related to a field of personal interest or a hobby

Other areas you participate in (indicate)_____

6. Why do you use online communities and social networks? Indicate the 3 reasons that are most important to you, with the most important one indicated first. (*Change the order the statements are presented in.*)

To maintain contact with the people I know

To make contact with new friends and acquaintances

To find like-minded people (e.g., people involved in the same hobby, civic or professional activity) in Lithuania

To find like-minded people (e.g., people involved in the same hobby, civic or professional activity) abroad

To discuss personal problems

To discuss social problems

To provide others with useful information, share my experience

To broaden my horizons

To find more information about the issues that concern me

For entertainment (playing games, watching/sharing videos, films, listening to/sharing music, etc.)

To vote on, evaluate and rate things that I like (e.g., rating a book that I have read or a film that I have seen, etc.)

To express my opinion or position as it relates to certain products/services

To find information about certain products/services

To purchase/sell/exchange products/services

To participate in lotteries

To generate and propose new ideas, initiatives and projects

To contribute to ideas, initiatives or projects that have been initiated

To make certain decisions (e.g., voting for a certain initiative, choosing who to donate to, etc.)

Other *(indicate)* _____

(Question 7 only for those who do not use online community websites, Q3=0)

7. Why do you not use online communities and social networks? *(Several answers possible. Change the order the statements are presented in*)

I do not find this method of communication acceptable

I do not have time for it

It violates my privacy

I do not know how to use it

I was registered to such a site previously, but I did not like it

I am not interested in such things

This is a waste of time, I do not see any point in it

This does not help solve anything – you can talk about it all you like, but this does not lead to any further step in the solution

Nothing will come of it either way, nothing will change and talk will just be talk

State authorities do not look into or use the information circulating in online communities

The information presented is not sufficiently objective, everything is very subjective

I cannot find any information that would be useful to me

It is not safe to use such websites

Expressing your opinion is dangerous

I have not heard anything about such websites, I do not know anything about them

Other (indicate) _____

(Question 8 for those who use the internet, Q1≠0)

8. Indicate 3 of the most well known Lithuanian news sites (on a national level):

(Indicate)

0. I don't know any

1. _____
2. _____
3. _____

Note to interviewer: only mention the following examples if the participant answers "I don't know any" or does not understand the question: (e.g., Delfi.lt, Alfa.lt, Bernardinai.lt, Vz.lt, LRytas.lt, Balsas.lt, 15min.lt).

9. Indicate 3 of the most well-known regional or local news sites:

(Indicate)

0. I don't know any

1. _____
2. _____
3. _____

Note to interviewer: only mention the following examples if the participant answers "I don't know any" or does not understand the question: (e.g., vilniausdiena.lt, alytausgidas.lt, kaunozinios.lt, etc.).

10. Indicate 3 specific projects that have been initiated online
(Indicate)
0. I don't know any
1. _____
2. _____
3. _____

Note to interviewer: only mention the following examples if the participant answers "I don't know any" or does not understand the question: *(e.g., e-peticija.lt, skalunai info.lt, darom.lt, etc.).*

11. Indicate the 3 most well known online communities, social networking sites or online conferences
(Indicate)
0. I don't know any
1. _____
2. _____
3. _____

Note to interviewer: only mention the following examples if the participant answers "I don't know any" or does not understand the question: *(e.g., Facebook.com, One.lt, LinkedIn.com, Frype.lt, MySpace.com, Google+).*

(Question 12 for those who use online social networks, Q3 ≠0)
12. Indicate the 3 online communities or social networking websites that you spend the most time on.
(Indicate)
0. I don't know any
1. _____
2. _____
3. _____

(questions for those who use the internet, Q1≠0)
13. Which of the following online civic initiatives do you know?
1. manoseimas.lt
2. lietuva2030.lt
3. manobalsas.lt
4. aslietuvai.org

5. lietuva2.lt
6. mannedzin.lt
7. seime.lt
8. geradarytigera.lt
9. darom.lt
10. atviratv.lt
11. rupi.lt
12. parasykjiems.lt
13. skaidrumolinija.lt
14. peticija.lt
15. e-peticija.lt
16. teisepasirinkti.lt
17. skalunai.info
18. Smart&Green City
19. „Global Lithuanian Leaders“
20. Transparency International lt
21. Other *(indicate)*_____
99. (Do not read) Does not know any

14. Do you use websites targeted at discussing/solving social problems (e.g., for formulating proposals about how to reduce alcoholism in Lithuania, for submitting open letters written by citizens to state authorities about amendments to certain laws, initiating referendums and so on)? If so, then what websites do you use?

I don't use any (*move on to question 18*)

I use such websites *(indicate)* _____

(Questions 15-17 are for those who use websites for online civic initiatives (Q 14=1))

15. What do you do on websites targeted at discussing/solving social problems? *(Several answers possible)*

1. I look for like-minded people
2. I try to broaden my horizons
3. I find information that I need
4. I gain professional experience
5. I find objective information about various political or social issues
6. I find other kinds of subjective information about various political or social issues

7. I propose new ideas, initiatives and projects
8. I contribute to projects that have already been initiated by suggesting possible improvements and sharing what I know
9. I find and identify various social problems
10. I contribute to solving social problems in Lithuania, I do something good
11. I express my opinion
12. I vote for proposed projects, initiatives
13. I only participate as an observer, I watch what is happening
14. I take an interest in and absorb information because it relates to my profession
15. I take an interest in and absorb information because it relates to my studies, research
16. It is interesting to read various articles and comments
17. Other (*indicate*) _____

16. Speaking of websites, online communities and initiatives targeted at discussing and/or solving social problems, which fields or activities are most important to you? *(Several answers possible.)*

Political issues
Social issues
Issues related to education and science
Issues related to ecology, environmental protection, global warming
Economic issues
Volunteering
Creating and supporting various social initiatives
Initiating, organising and supporting various protests
Supporting initiatives for the reduction of anti-social behaviour and criminal activity
I'm not interested in any specific fields, I just find it interesting to read about what others think and care about
Other fields and activities (*indicate*) _____

17. What kind of content or topics do you feel are missing in terms of online communities and initiatives? *(Several answers possible.)*

Nothing is missing
Discussion of political issues

Discussion of social issues
Discussion of issues related to education and science
Discussion of issues related to ecology and environmental protection
Discussion of economic issues
Information about volunteering
Creation and support of various social initiatives
Initiation, organisation and support of various protests
Support of initiatives for the reduction of anti-social behaviour and criminal activity
Other fields and activities that are missing (*indicate*) _____

(Question 18 for those who use the internet, (Q 1≠0) and do not know or participate in any online activity targeted at solving social problems (Q 14=0))

18. Why do you not use websites or participate in online communities or initiatives that are targeted at discussing and/or solving social issues? *(Several answers possible)*

1. I participate in other activities (civic parties, social/civic volunteer work, non-governmental organisations involved in social/civic activity, etc.)
2. I am not interested in such activity
3. I do not have time for this
4. I do not ever encounter information or activity related to social/political problems
5. I cannot change anything either way, nothing will ever change
6. My opinion will not be valued
7. I am afraid, I don't want people to make fun of me or publicly comment on my activity
8. I do not want to lose my job
9. I do not want to be attacked, put down or slandered
10. I do not want to be physically attacked for my beliefs
11. I do not want to receive threats targeting me, my family or my close ones
12. I do not want to be suspected of selfish dealings
13. I do not know anything about this
14. Other reasons (indicate) _____

(Question 19 is for those who use websites for virtual civic initiatives (Q 14=1))

19. In general, how satisfied are you with online communication when attempting to discuss or solve social/political problems?

Very satisfied
Satisfied
Neither satisfied, nor dissatisfied
Dissatisfied
Completely dissatisfied

ANNEX 2: Data on sample selection for quantitative research sample

Table 48. Sample selection by geographical distribution

County	15-74- year old residents		Sample by number
	N	%	N
Vilnius city municipality	416892	18,1	181
Kaunas city municipality	239826	10,4	104
Klaipėda city municipality	123900	5,4	54
Šiauliai city municipality	83484	3,6	36
Panevėžys city municipality	76347	3,3	33
Vilnius county	208224	9,0	90
Utena county	114770	5,0	50
Kaunas county	219135	9,5	95
Alytus county	118458	5,1	51
Marijampolė county	119619	5,2	52
Panevėžys county	111665	4,8	48
Šiauliai county	142515	6,2	62
Tauragė county	81731	3,5	35
Telšiai county	113636	4,9	49
Klaipėda county	132263	5,7	57
Total	2302465	100	1000

Table 49. Distribution of sample selection by urban and rural areas

Area	15-74- year old residents		Sample by number
	N	%	N
Urban	1565676	68,0	680
Rural	736789	32,0	320
Total	2302465	100	1000

Table 50. Distribution of sample selection by size of area

Size of area	15-74- year old residents		Sample by number
	N	%	N
Vilnius city municipality	416892	18,1	181
Kaunas city municipality	239826	10,4	104
Klaipėda city municipality	123900	5,4	54

Šiauliai city municipality	83484	3,6	36
Panevėžys city municipality	76347	3,3	33
Other cities/towns	625227	27,2	272
Country	736789	32,0	320
Total	2302465	100	1000

ANNEX 3: The form (for participants) of agreement to participate in the interview

Participant's agreement

I am informed that:

1. _____

represent at Mykolas Romeris university, Vilnius, Lithuania, the implementation of the scientific project "Social technologies Contribution to Collective Intelligence Development in Online Community"(Project code No VP1-3.1-ŠMM-07-K-03-030) (thereinafter Project).

2. The Project is aimed at the creation of the collective intelligence system conceptual dynamic model which will help to understand the peculiarities of collective intelligence functioning and development process. To serve the purpose of the Project, with the help of the interview the initiators participants of the socially oriented virtual communities are being questioned.

3. The aim of the interview is to obtain the knowledge about specificity of the participation in the socially oriented online communities.

4. The participation in the Project research is random and not paid.

5. During the interview 3 questions covering topics are presented. The first group of questions is related to characteristics of the virtual project, the questions raised in the second part are related to social aspects of the project, the third group of questions concerns the online communities" result and/or influence evaluation. The anticipated interview duration is 1 hour.

6. There are no possible risks related to the participation in the Project.

7. The results of research will be published publicly, however, any research participants' private data will not be made public and the following procedures ensuring confidentiality will be observed: (1) the interview participants will be coded in publications and public speaking; (2) By analysing data in Atlas.ti medium the interview participants are coded, not linking data to a particular person; (3) the interview participants are coded in order to avoid any direct association with their identity; (4) the recordings of interview will be destroyed when the text is transcribed and placed in Atlas.ti data analysis software.

8. The issues related to the Project research or to the participation in it, could be addressed to the Project administrator Olgą Navickiene, Mykolas Romeris university, Vilnius, Lithuania, tel. (8-5) 2714 734, el. mail address navickiene@mruni.eu.

I made myself familiar with the information presented above-mentioned. I understand that I can refuse to participate in the Project research without suffering any losses or fines. I am provided with the copy of this agreement.

_____

The research participant's signature, name, surname

_____

Date

_____

Contact telephone, el. address

ANNEX 4: The form (for initiators) of agreement to participate in the interview

Participant's agreement

I am informed that:

1. _____

represent at Mykolas Romeris university, Vilnius, Lithuania, the implementation of the scientific project "Social technologies contribution to collective intelligence development in online community"(Project code No VP1-3.1-ŠMM-07-K-03-030) (thereinafter Project).

2. The Project is aimed at the creation of the collective intelligence system conceptual dynamic model which will help to understand the peculiarities of collective intelligence functioning and development process. To serve the purpose of the Project, with the help of the interview, the initiators of the online communities socially oriented are being questioned.

3. The aim of the interview is to obtain the knowledge about specifics of the participation in the socially oriented virtual communities.

4. The participation in the Project research is random and not paid.

5. During the interview 3 questions covering topics are presented. The first group of questions is related to characteristics of the virtual project, the questions raised in the second part are related to social aspects of the project, the third group of questions concerns the online communities' result and/or influence evaluation. The anticipated interview duration is 1 hour.

6. There are no possible risks related to the participation in the Project.

7. The results of research will be published publicly, however any research participants' private data will not be made public and the following procedures ensuring confidentiality will be observed: (1) the interview participants will be coded in publications and public speaking; (2) By analyzing data in Atlas.ti medium the interview participants are coded, not linking data to the particular person; (3) the interview participants are coded in order to avoid any direct association with their identity; (4) the recordings of interview will be destroyed when the text is transcribed and placed in Atlas.ti data analysis software.

8. The issues related to the Project research or to the participation in it, could be addressed to the Project administrator Olgą Navickiene, Mykolas Romeris university, Vilnius, Lithuania, tel. (8-5) 2714 734, el. mail address navickiene@mruni.eu.

I made myself familiar with the information presented above-mentioned. I understand that I can refuse to participate in the Project research without suffering any losses or fines. I am provided with the copy of this agreement.

_____

The research participant's signature, name surname

_____

Date

_____

Contact telephone, el. address

ANNEX 5: Qualitative research questionnaire for project participants

1) Context, organization, characteristics

a) General demographic questions; Experience while participating in the activity of online communities

2) CI CAPACITY POTENTIAL INDEX

a) Current situation

i) Virtual project characteristics

- What is the size of the group? What kind of people participate (students, managers, the media, bloggers, middle managers, professional marketers/lawyers or e.g. unemployed)? Experience, age, education? Have they participated in the projects, or are just beginners? Geographical dissemination?
- How useful is the diversification of online community project group?
- How often do they communicate in the project? What influence does the activeness of other groups participants have on participants?
- Are there any leaders and what are their functions?
- Hierarchical relations? Do they exist?
- How have they (participants) rallied?
- How are congenials attracted (only for projects or constantly)? How are they motivated?
- How do the virtual projects management features contribute to the project success: the possibility to act in the team?
- Is there a possibility to act at any time convenient for participant independently whether it is work or leisure time?
- How is the project reputation communicated, what decisions (direct/indirect) prompt participants about the project leaders" reputation?
- How much time on average is dedicated for the project per week in hours: by "the core", by "the particular project team", by the other participants of virtual place?
- Is it announced where and how decisions will be realized?

ii) Processes

– What aims/activities/functions are the most important in the project (e.g., presentation of ideas, voting, creation)? Who has chosen the aims of platform? How has it been formed?
– Who makes the decisions related to the project's aims/activities/functions?
– Are you satisfied how the activities/processes are carried out? Is everything carried out in the way you expected?
– When did the participant join the project (at the beginning, during the course of the project)?
– Is the project vital? No: When did it stop to be vital? Why? Yes: how do you keep the vitality of the project?
– What is the way for the generated ideas to be collected? What is the way to filtrate the ideas (is there a formal/informal procedure)? How are the ideas classified? How and who classifies them? Informal e.g. delete if it is not active.
– What are the ways to deal with the ones who confront, damage?
– Who has the influence? E.g.: high/low trust in technologies, privacy safeguard, personal data security, some other reasons related to the security.

iii) Technologies

– Can the anonymous or public participation be chosen? Has it any influence? (to ask conversely).
– Do you offer to change anything? If not - why? If yes - what?
– Is there a possibility to see what the others are doing? On-line state?
– Is there a man who looks after the system? Its permanent work? Is there a place where you can apply to? Is there anyone you can complain of damages? Or the inappropriate conduct of other participants?

b) The situation to be pursued

i) Virtual project characteristics

– In your opinion what is the optimal size of the online community project group? What kind of people should participate in the project of the online community (students, managers, the media, bloggers, middle managers, professional marketers/lawyers or e.g. unemployed)? Should there be more/less diversification?

– What should the optimal frequency of communication be?
– What means of motivation could be applied? What could help to attract more participants?
– What hierarchical structure could be perfect?

ii) Technologies

– What could be implemented in addition if money was not a restrictive factor?
– If the number of participants has extended should it be necessary to filtrate, classify and so on?
– Ideal platform (in terms of technologies)

iii) Processes

– What is necessary in order to maintain the vitality/the participants" activeness?
– How could the conflict situation be solved (blocking and so on)? Who should do this?

3) SOCIAL ORIENTATION INDEX

a) Current situation

i) Participants" values

– To what extent are the different social problems included? Are certain topics restricted? Could social challenges, all without the exception requiring to take a decision, be offered?
– Do you have any internal criteria depending on which you choose projects/initiatives?
– Are you interested what social criteria are announced in their internet site? Is it announced publicly?
– What social challenges do the project initiators consider to be solving?
– Is it important for you what the project initiators" financing sources are? To what extent do the project initiators depend on the financing sources?
– What values do the other project participants communicate?

b) The situation to be pursued

– Should the projects include social problems to a larger extent?
– What social challenges do you see in Lithuania?
– What social challenges do you see in the EU/in the world?
– What groups could finance such projects?

– What other problems could be solved by using the virtual platforms?

4) PERFORMANCE INDEX

a) Current situation

i) *Group participants' contribution*

– Is the number of the remaining active participants relevant for you?

ii) Implementation and assessment

– Would it be it relevant for you if the projects results/ideas were implemented in practice? Do you seek to be aware of it/to influence it?

– Have the ideas generated in the projects you participated been implemented? What do you suppose to be the reasons of the ideas implementation /not implementation? To ask to name the success stories and to explain why they are "successful".

– Have the decisions been made in the participants group?

iii) *Publicity and results dissemination*

– Are there any people in particular responsible for publicity? Are they announced publicly? Are they often mentioned in a press? What kind of sources?

– Have they been granted prizes for any kind of initiatives?

– How do decisions makers react that ideas/offers are generated by the online community? Are your offered ideas being manipulated (i.e. if they coincide with political, social interests - use, if not – ignore?)

b) The situation to be pursued

– How actively would you like to contribute in order to achieve the aims of organization /project?

– Is it possible to act in the non-virtual place analogically? What outcomes could be?

– How else will it be possible to realize in practice the obtained decisions/ideas by using social technologies?

5) DEFINITIONS

a) Platform: Virtual/online place, means, or opportunity for public expression of opinion.

b) Social orientation: Business philosophy that takes the society's well-being into account, in addition to the satisfaction of the consumers" wants.
c) Socially oriented virtual platform: virtual/online place, means, or opportunities for public expression of opinion that takes the society's well-being and satisfaction of its needs into account.
d) Tools: Google groups, Email groups, Yahoo groups, Facebook, Forums, Organization owned platforms

ANNEX 6: Qualitative research questionnaire for project initiators

1) Context, organization, characteristics

e) Describe the mission, aim, tasks of the virtual social platform. History. What does the organization do in all?

2) CAPACITY FOR POTENTIAL CI INDEX

a) Current situation

i) Virtual project characteristics

– What is the size of the group? What kind of people participate (students, managers, the media, bloggers, middle managers, professional marketers/lawyers or e.g. unemployed)? Experience, age, education? Have they participated in the projects, or are just beginners? Geographical dissemination?
– How useful is the diversification of the online community project group?
– How often do they communicate in the project? What influence does the activeness of other groups participants have on participants?
– Are there any leaders and what are their functions?
– Hierarchical relations? Do they exist?
– How have they rallied?
– How are congenials attracted (only for projects or constantly)? How are they motivated?
– How do the virtual projects management features contribute to the project success: the possibility to act in the team?
– Is there a possibility to act at any time convenient for participant independently whether it is work or leisure time?
– How is the project reputation communicated, what decisions (direct/indirect) prompt participants about the project leaders" reputation?
– How much time on average is dedicated for the project per week in hours: by "the core", by "the particular project team", by the other participants of the virtual place?
– Is it announced where and how decisions will be carried out?

ii) Processes

– When was the virtual project started?

– Is the project vital? No: When did it stop to be vital? Why? Yes: How do you keep the vitality of the project?
– What aims/activities/functions are the most important in the project (e.g., presentation of ideas, voting, creation)? Who has chosen the aims of platform, how has it been formed?
– How to make decisions and who makes the decisions related to the project's aims/activity/functions?
– Are you satisfied how the activities/processes carried out? Is everything carried out in the way you expected?
– Are there any intentions to change anything? If not - why?
– What is the way for the generated ideas to be collected? What is the way to filtrate the ideas (is there a formal/informal procedure)? How are the ideas classified? How and who classifies them? Informal e.g. delete if it is not active.
– What are the ways to deal with the ones who confront, damage?
– What has the influence? E.g.: high/low trust in technologies, privacy safeguard, personal data security, some other reasons related to the security.

iii) Technologies

– Can the anonymous or public participation be chosen? Has it any influence? (to ask conversely).
– How to choose the platform? What technical tools did you apply? Let them in the ad-lib form name the technological standardized decisions which they use in their activity (e.g. Google Docs, Web page, CRM and so on). Have they created anything of their own?
– Are there any arrangements to change anything? If not - why?
– Is there a possibility to see what the others are doing?
– Is there a man who looks after the system? Its permanent work?
– Who created (software work)?

f) The situation to be pursued

i) Virtual project characteristics

– What is the optimal size of the online community project group? What kind of people should participate in the project of the online community (students, managers, the media, bloggers, middle managers, professional marketers/lawyers or e.g. unemployed)? Should there be more/less diversification?

– What is the optimal frequency of communication?
– What means of motivation could be applied? What could help to attract more participants?
– What hierarchical structure could be perfect?

ii) Technologies

– What could be implemented in addition if money was not a restrictive factor?
– If the number of participants has extended will they filtrate, classify and so on?
– Ideal platform (in terms of technologies)

iii) Processes

– What is necessary to maintain the vitality/the participants" activeness?
– How could the conflict situation be solved (blocking it and so on)? Who should do this?

3) SOCIAL ORIENTATION INDEX

a) Current situation

i) Initiators" values

– To what extent the different social problems are included? Are certain topics restricted? Could social challenges, all without the exception requiring to take a decision, be included?
– Do they have their internal criteria depending on which the projects/initiatives are chosen? What social criteria are announced in their internet site? Is it announced publicly?
– Have they carried out projects "just for money"?
– What social challenges do the project initiators suppose are solving?
– What are their financing sources? To what extent do the project initiators depend on the financing sources?

ii) Participants" values

– What values do the project participants communicate? Do cultural and emotional environments influence them?

a) The situation to be pursued

– Would they like to include social problems to a larger extent?
– What is the participants" opinion? What social challenges do they see in Lithuania?

– What social challenges do they see in the EU/in the world?
– What other problems could be solved by using the virtual platforms?
– What groups could finance such projects?

4) PERFORMANCE IDEX

b) Current situation

i) Group participants" contribution

– Is contribution of the group participants (e.g. the most active and passive) assessed? To what extent is the number of the remaining active participants relevant for you?
– How is the number of ideas (offered, developed, realized) assessed? How many of the generated ideas prompt about the project success?
– How is the idea distinguished from the comment? (technical solutions)?
– Do you use the statistical visiting information? Name social network which you use actively (Facebook, Twitter, LinkedIn, Google+ and similar), and all other similar (Youtube, Pinterest, ResearchGate and so on). Do they control or maybe know the number of followers, likers, the number of individual visits?

ii) Implementation and assessment

– Do you seek to implement the projects results/ideas in practice? What are the ways to seek it ?
– How is the achievement of aim measured? Who assesses the influence? Have you ever tried to measure the influence?
– Which part of the generated ideas has been realized? What are the reasons of the ideas implementation /not implementation ? To ask to name the success stories and to explain why they are "successful".
– Are taken decisions formalized? Are they available in the group?

iii) Publicity ant results dissemination

– Are there any people in particular responsible for publicity? Are they announced publicly? Are they often mentioned in a press? What kind of sources?
– Have they been granted prizes for any kind of initiatives?
– How do decisions makers react that ideas/offers are generated by the online community? Are your offered ideas being manipulated (i.e. if they coincide with political, social interests - use, if not – ignore?)

b) The situation to be pursued

- What contribution of the participants would you like? How would it help to achieve the organization‘s/project‘s aims?
- Is it possible to act in the non-virtual place analogically? Were there any attempts to transfer the ideas from the online community to the real communities? What were the outcomes?
- How else would it be possible to realize in practice the obtained decisions/ideas by using social technologies?

5) DEFINITIONS

- Platform: Virtual/online place, means, or opportunity for public expression of opinion.
- Social orientation: Business philosophy that takes the society's well-being into account, in addition to the satisfaction of the consumers" wants.
- Socially oriented virtual platform: virtual/online place, means, or opportunities for public expression of opinion that takes the society's well-being and satisfaction of its needs into account.

Tools: Google groups, Email groups, Yahoo groups, Facebook, Forums, Organization owned platforms

ANNEX 7: A fragment of experimental research instrument and evaluation of results

Evaluation criterion	Community X1	Community X2	Community X3	Community X4	Community X5
Diversity of participants according to gender, age, nationality	Average diversity: according to GA no data available. According to FB age group – 25-34 year-old. Younger participants missing	Average. No data	Average. No data about participants" gender, age. Diversity defined by Lithuanian cities	Average. No data available. But the webpage is in English, meaning that it is likely to contain diversity of nationalities. Not limited by gender but limited by occupation, duration of work experience and international experience. Only those who meet the set criteria can get access	Average. Not limited by gender, but limited possibility for diversity of nationalities as the webpage is in Lithuanian
Level of problem solving/ diversity of proposed ideas	Diversity of issues under discussion is great (31 category for proposals)	Low. The main is environment and promotion of volunteering and citizenship is not directly stated	Low. The only problem is corruption	Average. Directed towards a broad problem (growth of economy) within several fields, i.e., entrepreneurship, leadership, networking, promotion of innovative businesses	Average. Although categories of posts are various, just one problem for solution – acting together/collaboration

Level of knowledge dissemination possibilities	High level of knowledge dissemination possibilities (FB, Twitter, Google+, LinkedIn, e-mail)	Average (Facebook and Twitter)	Average. Dissemination possibility through Facebook	Average (Facebook and Twitter)	Average (Facebook and Google)
Level of game - based approach environment realisation	Game-based approach environment realisation level is average, as it contains competition elements (voting, for/against, best solution providers)	Low. No competition elements	Low. No competition elements	Low. No competition elements available to everyone (different environment is provided just for registered users)	Low. No competition elements
Level of adaptation to different age groups	Low. Webpage addresses the public in general. Different age groups not distinguished	Low. Webpage addresses the public in general. Different age groups not distinguished	Low. Webpage addresses the public in general. Different age groups not distinguished	Low. Webpage addresses the public in general. Different age groups not distinguished	Low. Webpage addresses the public in general. Different age groups not distinguished
Activity level (voting/ presenting comments)	Average	Low. No voting opportunities	Average. There is comments option, comments are presented	Low. No interactive elements, except filling up the form	Low. No such elements
Level of visits	High - 88277 since 2013-11-01	Average. No data about main page visitors	Average. 184 posts since 2012-10-18	Average. No data about main page visitors	Average. No data about main page visitors, but can visually be assessed by number of posts

General level/ number of unique visitors active participation	High- 60334 since 2013-11-01	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data about main page visitors. Can be guessed that after registration users directed to LinkedIn (as visitors are asked to present LinkedIn address). Then LinkedIn 1028 members	Average. No data about main page visitors, but can be guessed visually by number of posts
Frequent users activity level/ number	High - 30024 since 01 -11-2013	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data about main page visitors, but can be guessed visually by number of posts
Ratio/level of unique visitors and contributors	High - 7393 electronic signatures to organise a referendum during observed period. However, further evaluation - average, as most of suggestions are supported by less than 100 supporters. On the other hand 100 initiative supporters in Lithuania context is a lot.	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data about main page visitors, but can be guessed visually by number of posts
Level of unique visitors conversion into registered visitors	No data, but Lithuania 20 most probably could present the number of registered users	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data about main page visitors	Average. No data available about main page visitors, but by number of posts can be guessed the number of visitors as only registered users can post or comment.

Contributors" activity level	It is not possible to get the number of registered supporters from GA, but they have to know number of users who have given at least one proposal since 2013-11-01. However, suggestion is that average as a core of active people can be observed, not many	Average. Facebook (6,568 likes, 68 visits-2014-11-06), Twitter (Tweets -24, Following-247, Followers-88) 2014-11-06	Average. Facebook 2,722 likes, 20 visits	Average. Facebook like 2288 likes, LinkedIn 1028 members	Low. 524 likes
Technological support (decisions) level for idea development	Technological support level very high in Lithuanian context. Evidenced by test with referendum voting. Also integration with banks	Low. No instruments for idea presentation and development	Average. Possibility to announce corruption facts, for other participants to react(write comments) concerning every post	Low. No instruments for idea presentation and development (only those who joined the community through LinkedIn platform develop ideas)	Low. No instruments for idea presentation and development, only registered users can comment other posts
Level of comprehensiveness analysis of alternatives	Average .technical possibilities for analysis. Use is low	Low. No instruments for problem solving alternatives	Low. No instruments for analysis of alternatives	Low. No instruments for analysis of alternatives	Low. There is just a possibility for registered users comment other posts
Variety/level of ways of presenting opinion	High. Although main way is voting but there is an alternative to present opinion in different ways	Low. No instruments to express opinion	High. Possibilities to post in page, write emails, call, react through Facebook	Low. No instruments to express opinion	Low. No instruments to present and develop ideas, just registered users can comment other posts

Level of procedures that guarantee equal opportunities to express and defend their views, to avoid bias	High - clear procedure, presented values	Low. No options for discussions	High. Clear procedures in terms of information content announced, how to avoid blackmail. Initiators provide information about applied procedures in case content is inappropriate. There is an option to respond to a comment and share	Low. No options for discussions	Average. Rules are defined. No clear indication, but one can envisage pursuit to guarantee circulation of correct information
Level of criticism	High - procedure to express opposite view and solve disagreements	Low. No option for discussions	Average. There is an option for discussion, response and comment content sharing	Low. No option for discussions	Low. Few comments on presented cooperation ideas
Depth of problem analysis	Average - Possibilities for discussions , they take place in some cases but could be more active	Low. Problems, that are solved by the community are described in a very concentrated way	Average. Options for discussions but analysis of separate posts comments and discussions are not developed	Low. Problems solved by the community described in a concentrated manner, oriented to what community pursues and implements rather than topic itself	Low. Few comments on presented cooperation ideas

Level of personal privacy protection	Average. Minimum security/ privacy measures. During referendum was an attempt to "break" the page, but failed.	Low. Not announced	High. Procedures defined, notification about installed security measures. Created possibilities to guarantee anonymity and privacy.	Low. Not notified. For registered users communicating via LinkedIn general security and privacy rules of LinkedIn portal are presented	Average. Minimum rules of privacy and users data security that one has to accept if case of registration
Level of anonymity	Low. Persons who speak are identified and citizens are encouraged not to hide but openly express their opinion	Average. Those who are willing to join the community have to write an email	High. Opportunities to retain participants" anonymity are created. But participant must decide whether he/ she makes use of anonymity guarantees	Low. Those who wish to join the community have to present information: name, surname, city, place of work, occupation, professional competence, international competence, LinkedIn address	Low. At the moment of registration correct information about a person is required (this prerequisite is defined in the rules)

ANNEX 8: Composite CI Capacity and CI Emergence indices mathematical calculations

DIMENSIONS / COMMUNITIES	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	CI in total		
CI Capacity Index														
Degree in diversity in the source of ideas[243]	0,7500	0,2500	0,2500	0,5000	0,5000	0,5000	0,5000	0,7500	0,2500	0,5000	0,0000	**0,4318**	**0,3295**	Capacity for creativity identifies degree of diversity, dynamism and openness
Degree in engagement forms	0,3333	0,1667	0,1667	0,1667	0,1667	0,1667	0,1667	0,3333	0,3333	0,3333	0,1667	**0,2273**		
Supply of "Critical mass" (swarm effect)	0,8571	0,4286	0,5000	0,4286	0,3571	0,3571	0,3571	0,4286	0,5714	0,0714	0,1429	**0,4091**	0,4091	Capacity for aggregating and creating knowledge
Efficiency of problem solving	0,7500	0,0000	0,2500	0,0000	0,0000	0,0000	0,0000	0,0000	0,2500	0,2500	0,2500	**0,1591**	**0,2273**	Capacity for decision making and problem solving
Degree of decentralization	1,0000	0,0000	1,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	**0,1818**		
Degree of independency	0,7500	0,1250	1,0000	0,0000	0,0000	0,2500	0,2500	0,2500	0,2500	0,2500	0,6250	**0,3409**		
CI Capacity Index	**0,7401**	**0,1617**	**0,5278**	**0,1825**	**0,1706**	**0,2123**	**0,2123**	**0,2937**	**0,2758**	**0,2341**	**0,1974**			
CI Emergence Index														
Degree of development of shared structure and culture	0,6667	0,1667	1,0000	0,1667	0,1667	0,3333	0,3333	0,5000	0,1667	0,3333	0,1667	**0,3636**	**0,5341**	Potential for self-organization
Adequacy in form of self-organization to community task	0,8750	0,5000	1,0000	0,3750	0,3750	0,7500	0,7500	0,8750	1,0000	0,6250	0,6250	**0,7045**		

Degree of development of new qualities in form of ideas, activities, structured opinions, competencies etc.[244]	0,6667	0,1667	0,1667	0,5000	0,5000	0,3333	0,3333	0,1667	0,3333	0,5000	0,5000	**0,3788**	**0,3826**	Intensity of Emergence of CI
Development of distributed memory system	0,7500	0,0000	0,2500	0,2500	0,2500	0,2500	0,5000	0,2500	0,7500	0,7500	0,2500	**0,3864**		
Ability to adapt changes. Development of improvements and learning processes within the community	0,5000	0,5000	0,7500	1,0000	1,0000	0,0000	0,2500	1,0000	1,0000	0,7500	0,7500	**0,6818**	**0,6818**	Potential for adaptivity
CI Emergence Index	**0,6917**	**0,2667**	**0,6333**	**0,4583**	**0,4583**	**0,3333**	**0,4333**	**0,5583**	**0,6500**	**0,5917**	**0,4583**			

[243] The categories in pink color have higher value in weight in CI Capacity Index.

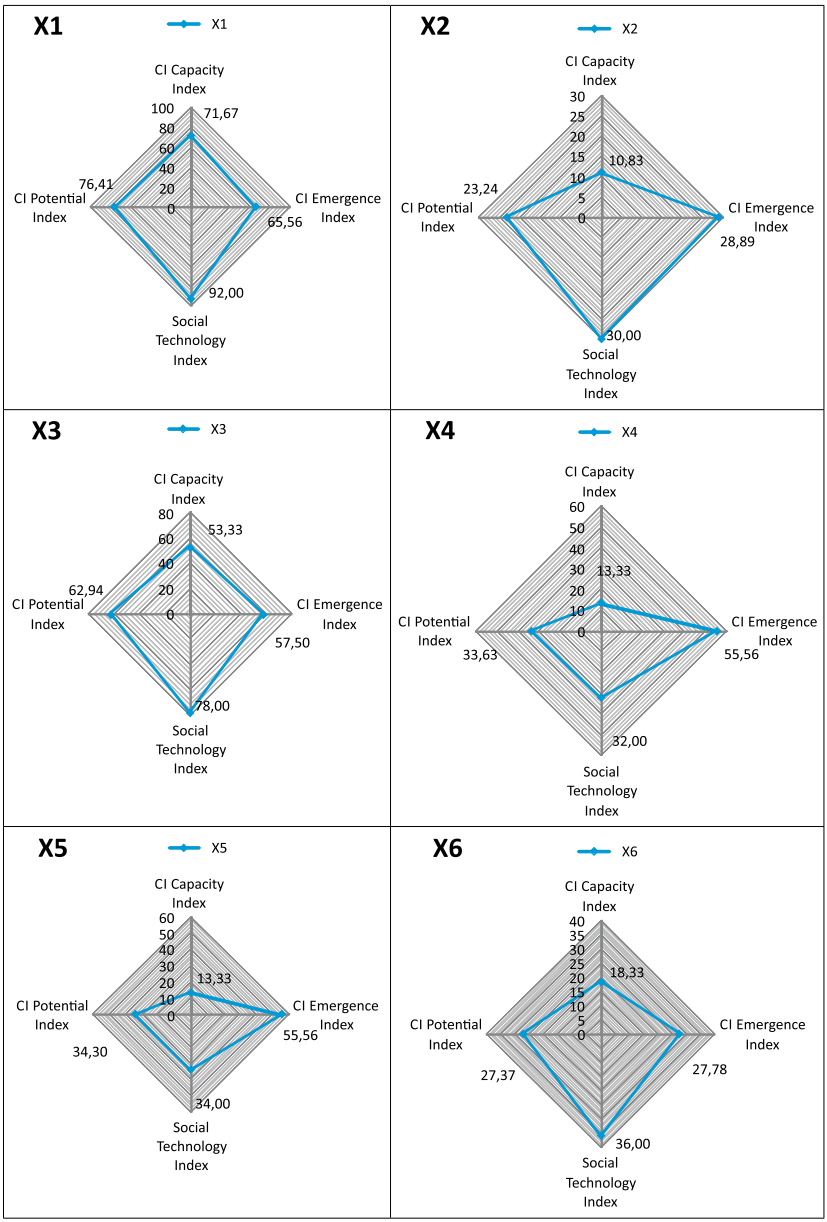
[244] The categories in blue color have higher value in weight in CI Emergence Index.

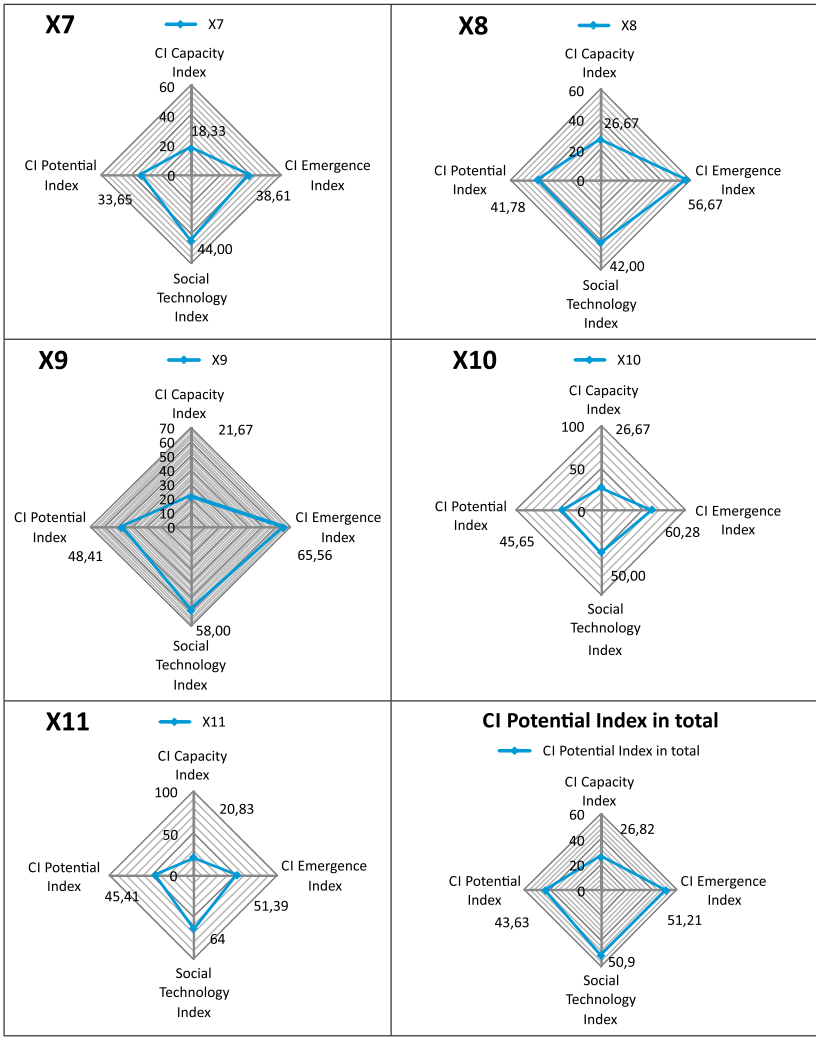
ANNEX 9: Social technology index mathematical calculations

Evaluation criterion	Dimensions	Categories	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11
Existence of mechanism for anonymous offering of ideas	0,54545	0,54545	0	1	1	0	0	0	0	1	1	1	1
Existence of synchronous and asynchronous chat tools, open forums etc.		0,27273	1	0	1	0	0	0	0	0	1	0	0
Provided access and integrated service to all devices (handhold, PCs etc.)		0,81818	1	1	1	1	1	0	1	1	1	1	0
Existence of mechanism for providing secure and legal activities, protection of personal data	0,45455	0,45455	1	0	1	0	0	1	1	0	0	0	1
Existence of mechanism of message control		0,45455	1	0	1	0	0	1	1	0	0	0	1
Existence of mechanism for collective brainstorming	0,36364	0,36364	1	0	1	0	0	0	0	1	0	0	1
Existence of mechanism to vote/rank idea/solution		0,27273	1	0	1	0	0	0	0	0	1	0	0
Existence of mechanism to make decision or conclusions		0,45455	1	0	1	0	0	0	0	0	1	1	1
Existence of mechanism to add value to content	0,51515	0,63636	1	0	1	1	1	0	0	0	1	1	1
Existence of mechanism to generate feedback		0,27273	1	0	1	0	0	0	0	0	1	0	0
Existence of technological solutions for knowledge visualisation and organisation		0,81818	1	1	1	0	0	1	1	1	1	1	1
Existence of mechanism for idea classification		0,54545	1	0	1	1	1	0	0	0	1	0	1
Existence of mechanism for mass argumentation		0,27273	1	0	1	0	0	0	0	0	1	0	0
Existence of mechanism to create interests groups		0,54545	1	0	0	0	1	1	1	0	0	1	1

Degree of user friendliness, speed and convenience	0,52727	0,63636	1	0,5	1	0,5	0,5	0,5	0,5	1	0,5	0,5	0,5
Quality of visualisation		0,63636	1	0,5	1	0,5	0,5	0,5	0,5	1	0,5	0,5	0,5
Level of development possibilities		0,27273	0,5	0	0	0,5	0,5	0	0	0	0,5	0,5	0,5
Design relation to task		0,81818	1	0,5	1	0,5	0,5	1	1	1	0,5	1	1
The perpetual beta (updating possibilities)		0,27273	1	0,5	0	0	0	0,5	0	0	0	0,5	0,5
Existence of mechanism to collect data	0,60606	0,81818	1	1	1	1	0	0	1	1	1	1	1
Existence of mechanism to evaluate and analyse performance		0,54545	1	0	0	1	1	0	0	0	1	1	1
Existence of mechanism to share and re-use the data		0,45455	1	0	1	0	1	0	1	0	1	0	0
			0,92	**0,3**	**0,78**	**0,32**	**0,34**	**0,36**	**0,44**	**0,42**	**0,58**	**0,5**	**0,64**

ANNEX 10: Capacity, emergence, social technology indices and collective intelligence potential index in total of 11 different communities




X7
X7
CI Capacity Index
60
40
20
0
18,33
CI Potential Index
33,65
CI Emergence Index
38,61
44,00
Social Technology Index
X8
X8
CI Capacity Index
60
40
20
0
26,67
CI Potential Index
41,78
CI Emergence Index
56,67
42,00
Social Technology Index
X9
X9
CI Capacity Index
70
60
50
40
30
20
10
0
21,67
CI Potential Index
48,41
CI Emergence Index
65,56
58,00
Social Technology Index
X10
X10
CI Capacity Index
100
50
0
26,67
CI Potential Index
45,65
CI Emergence Index
60,28
50,00
Social Technology Index
X11
X11
CI Capacity Index
100
50
0
20,83
CI Potential Index
45,41
CI Emergence Index
51,39
64
Social Technology Index
CI Potential Index in total
CI Potential Index in total
CI Capacity Index
60
40
20
0
26,82
CI Potential Index
43,63
CI Emergence Index
51,21
50,9
Social Technology Index

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SUMMARY

Social technologies is an interdisciplinary research field, which focuses on applying information, communication and emerging technologies to serve the goals of society. Generally, social technologies in this monograph are defined as digital technologies used by people to interact socially by creating, enhancing and exchanging content together. The scientific problem in this research work is defined as a question: how could social technologies contribute to the development of smart and inclusive society? The subject of the research are online community projects (Collective Intelligence systems) which include collective decision-making tools and technological solutions allowing and encouraging individual and team creativity, entrepreneurship, on-line collaboration, new forms of self-regulation and self-governance, self-configuration of communities by considering these projects as being catalyst for the emergence of CI. Collective Intelligence systems can be conceptualized as knowledge networks created by web-mediated interaction amongst individuals with personal knowledge. The development of the knowledge network is essentially based on the creation, transmission and fusion of knowledge within the community. Collective Intelligence systems are composed of humans and information communication technologies. Human intelligence in convergence with "machine" intelligence creates opportunities for network participants to achieve valuable activity results. Although online communities are often criticized for the lack of direct contact, yet, in comparison with traditional communities, the networked ones can operate more efficiently due to technologies that make it possible not only exchange large amounts of information, but also help to process the information more efficiently. The CI emergence in the system can be confirmed when the community exhibits higher intellectual abilities than an individual member does. New knowledge, ideas, found solutions, suggested problem-solving methods, integrated public opinion, structured opinions and views, developed innovations, prototypes, generated added-value, etc. are considered to be intellectual capacities of the community.

Many researchers have presented significant results in identifying the potential of Collective Intelligence (CI) to solve various societal problems or in modelling CI from a conceptual point of view (Luo, et al., 2009;

Malone, et al., 2009; Barahona, et al., 2012; Salminen, 2012; Kittur, et al., 2013; Prpić, 2014). Nevertheless, according to Lykourentzou et al. (2011), they do not solve an essential problem – "CI system design and optimization processes, through which collective intelligence will be able to emerge in a systemic manner". The main focus of this book's authors is not a self-expedient analysis of Collective Intelligence as a phenomenon, but the scientific identification of preconditions for Collective Intelligence to emerge, the enunciation of holistic conceptions, the prediction of possible development scenarios and the collection of empirical data on the value of Collective Intelligence for society. This purpose will be achieved through the following set of complementary and independent actions:

1. To define the phenomenon of Collective Intelligence, to evaluate the potential and benefits of Collective Intelligence to tackle societal changes by comparing CI with other forms of intelligence and by distilling the best practices of CI development from existing and new initiatives for online community projects targeting the integration of the various scientific approaches;
2. To identify the main social, managerial, legal challenges and risks (privacy, censorship and restrictions) for online communities projects by considering these projects as being sensors for the development of Collective Intelligence;
3. To identify social relationships and evaluate shared activities of participants in virtual platforms and to fulfil the analysis of how different technological solutions and design influence better or worse performance in networked communities;
4. To contribute to the emergence of new possibilities for the development of Collective Intelligence by providing advanced concepts and managerial, organisational and legal solutions and recommen_ dations empowering people or future communities to create new forms of decision-making, self-regulation, self-governance and self-configuration of communities, allowing and encouraging individual and community creativity, social entrepreneurship, etc.;
5. To introduce the conceptual system dynamic model of Collective Intelligence as a system for holistic understanding of knowledge management in online communities and to propose a set of criteria for measuring the Collective Intelligence Potential Index (CI Potential Index) based on the empirical research results.

The present system approach for monitoring Collective Intelligence is distinct in a wide range of research methods, preconditioned by complexity of the scientific problem and the interdisciplinary experience of the project team members. The key strength of the research methodology is that the CI phenomenon is examined by applying various scientific approaches to combine a range of perspectives into CI system model. Having assessed and integrated various approaches to CI, criteria for a CI emergence were identified and hypotheses on the impact of individual factors upon the CI potential in online communities were formulated. These hypotheses were tested in the course of quantitative research and analysed during the qualitative research process. The quantitative research identified the extent and trends of involvement and participation of CI development actors and other stakeholders. The quantitative research has also established the construction of the active Internet user profile and identification of the key legal risks of participation in online communities. The qualitative research was conducted to broaden knowledge about processes taking place during initiation and implementation of online community projects and to collect empirical data on features, singularities, stimulating factors and obstacles for Collective Intelligence to emerge. Results of the qualitative research have complemented insights of the quantitative research and grounded the framework for CI Potential Index (CIPI). The key dimensions, components and indicators of the framework were validated during a scientific experiment and the correlations between the variables were tested by developing the CI system dynamics model. The CI system dynamics model explains the knowledge management in online communities by developing Collective Intelligence.

The research group made an effort to identify the common characteristics shared by CI systems in order to develop a general CI Monitoring Technique which will be later adapted for virtual scientific environment (www.collective-intelligence.lt). The modelling approach was based on CI system functionality and identified the basic preconditions related to CI emergence. The monitoring technique is expected to facilitate IT developers, policy makers, business designers and user communities to recognize whether a system has the potential of becoming a CI system, to maximize the benefit that the community and individual users will receive from the system and decide on the adequate technological design and solutions. The Potential for Collective intelligence Index (CIPI) is a

relational conception that defines the capacity of online community for aggregating and creating knowledge, creativity and decision-making, ability for self-organizing, adaptivity and emergence of "swarm effect". The CI Potential Index has been designed around three indices: CI capacity, CI emergence and Social Technologies Index.

The conclusions present scientifically based managerial, organizational and legal measures that would activate and support the emergence of Collective Intelligence in innovative social technologies based platforms.

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Social Technologies and Collective Intelligence is a monograph written by 24 international researchers in the field of Social Technologies and edited by prof. dr. Aelita Skaržauskienė from Mykolas Romeris University in Vilnius, Lithuania. As an academic discipline, social technologies is a highly interdisciplinary research field that focuses on applying existing ICT as well as newly emerging technologies to improve society.

This work highlights the dominance of the non-technological social aspect of technology and its interaction with people, emphasizing the institutional power of Collective Intelligence through soft technology. By going through the book, the reader will gain insight and knowledge into the challenges and opportunities provided by this new exciting research field. Scientists will appreciate the comprehensive treatment of the research challenges in a multidisciplinary perspective. Practitioners and applied researchers will welcome the novel approaches to tackle relevant problems in their field. And policy-makers will better understand how technological advances can support them in supporting the progress of society and economy.

The book is divided into six parts, each dealing with a well-defined research area at the intersection of Social Technologies and Collective Intelligence. Instead of being split up five ways among particular groups of collaborating authors, each individual author contributes to all five parts of the book their specific knowledge and insights, which makes this monograph a truly collaborative effort and a prime example of collective intelligence.

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